



# **The Impact of the Intranet on Knowledge Management on the Omani Private Sector**

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First of all, my deep gratitude and thanks to ALLAH ALMIGHTY for enabling me to complete this project.

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## **Abstract**

The impact of the Intranet on knowledge management within an Omani organisational context is investigated. The main purpose is twofold, to investigate the use, benefit and impact of the Intranet on Omani organisations and to identify factors that make organisations successful in using an Intranet.

A quantitative survey is used as the main data collecting method, however, some qualitative means are used in each of two mini case studies to test the validity of the proposed model and inform a detailed case study. Using the strategy of multiple paradigms, the robustness of the results is shown to be increased and cross-validation is achieved. A number of statistical techniques such as descriptive statistic, Spearman correlation and regression are used to derive the results.

While most of the participants report the benefits from the use of the Intranet for their organisations in managing organisational knowledge, it is shown that currently Omani companies' experience is mostly limited to explicit knowledge. Furthermore, the empirical findings clearly link success with positive interaction between IT staff training, management support, availability of funds, user participation and organisational culture factors. The results of logistic regression analysis suggest that 89% of the variation in the level of Intranet usage within Omani companies is attributed to these factors.

The model presented not only gives a description of the use and benefits of the Intranet within Omani organisations but offers a prescription of the factors that need to be considered in the implementation of the Intranet and the consequent utilisation of the technology to its full potential. The factors are of great importance, particularly to practitioners hoping to change the attitudes and the behaviour of employees who are reluctant to actively participate in the acquisition and exchange of knowledge. In the adopting and implementing Intranet based strategies for knowledge management in Oman, it is vital that these factors are considered.



Practitioners and researchers alike will benefit from the results obtained. Researchers may benefit from the theoretical framework, which may form the basis for further empirical research. In addition, practitioners have gained models to guide them in implementing and using the Intranet to manage knowledge, the most valuable resource available to ensure organisational success.



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## **Chapter One**

### **Review**

#### **1.1 Introduction**

In today's global and competitive business environment, knowledge is the most valuable resource of companies. Survival in the current environment depends upon how firms generate, share and use knowledge to increase profits, reduce costs and improve processes in order to make the right decision at the right time.

The advancement in technology has led to the development and the establishment of the Internet technologies, which, when used within the organisational boundaries, is termed an Intranet.

The Intranet has been adopted at an astonishing rate by many organisations in the past few years (Bernard, 1998; Gonzalez, 1998; Scott, 1998). However, little research has been carried out to investigate whether the Intranet represents an incremental use of information technology in knowledge management, or a paradigm shift in the use of information technology in knowledge management. Researchers in the developed countries have reported the lack of research in this area (Blanning and King, 1998; Scott, 1998).

Information and knowledge, particularly in developing countries, is scattered in various places and in many systems, which makes it very difficult to find when urgently needed.

This research focuses on the use of the Intranet in knowledge management and identifies and examines factors that affect the use of Intranet in knowledge management within the context of the private sector organisations in the Sultanate of Oman.

The aim is to provide a theoretical approach, which can guide Omani organisations in implementing and using the Intranet in knowledge management, but with little modification the theoretical approach should be suitable for organisations in other particularly Arab, countries.



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### **1.2 Statement of the Problem**

Knowledge, particularly in the developing countries (such as Oman) is scattered in various forms (e.g. reports, documents, disks, PCs, mainframes etc) which makes it very difficult to access, share, and update.

Difficulty in accessing vital business information, redundancy and duplication of information across organisations is not uncommon, especially in the developing countries.

Companies have used various technologies over the last four decades to manage knowledge; however, previous technologies were not adequate for successful implementation and use of knowledge management due to the following reasons:

- It is very difficult, if not impossible, to access and share information and knowledge from and between heterogeneous (multi-vendor platforms) systems. Moreover, information stored on the mainframe computer is not easily accessible (Scott, 1998) especially for end users.
- Previous technologies were mainly used for information (mainly numeric data) and unstructured and semi-structured information, such as reports, memorandums, video and audio clips which were held remotely in isolation (often inaccessible) from those who need them. This view is supported by Sridhar (1998, p.20) who states *“traditionally, information accessed using a computer has been mostly limited to structured information residing in databases. The access to semi structured or unstructured information, such as memorandums and video clips, using the computer-based interface was cumbersome and difficult”*. Furthermore, according to Davenport and Prusak, (1998, p.129) most of the previous technologies are *“designed for managing data are structured, typically numerically oriented, and address large volumes of observations, knowledge technologies deal most frequently with text, rather than numbers, and text in relatively unstructured forms, such as clauses, sentences, paragraphs and even stories”*.

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- Previous technologies were expensive and not user friendly in comparison to the Intranet according to many researchers and practitioners (Bernard, 1998; Davenport and Prusak, 1998; Sridhar, 1998).

Recent studies have suggested the use of the Intranet to address the aforementioned problems (Bernard, 1998; Davenport and Prusak, 1998; Davies, 2000; Drew, 1999; Harvey et al., 1998; Hills, 1998; Gonzalez, 1998; Kim, 1998; Scott, 1998). Among these articles, there is evidence to suggest that the Intranet had an impact upon many business aspects and processes, particularly in the area of knowledge management. For example, the Intranet improves access to updated information, improves communication, enables knowledge sharing and IT integration, flattens organisational hierarchy, reduces cost, improves decision making, empowers users and facilitates organisational knowledge and learning. Much of the writings on the Intranet to date concentrate on organisations in developed countries. Lack of research in this area related to developing countries' organisations in general, and Omani organisations in particular, has created a gap in knowledge or guidance regarding the use and impact of the Intranet on organisational knowledge management. This research aims to fill this gap and to provide a model that can help Omani organisations utilise the Intranet in the area of knowledge management.

### **1.3 The Objectives of the Study**

To support the aim, the objectives identified for research are to:

- Explore the concepts of knowledge management;
- Investigate the use of the Intranet in knowledge management within the Omani business context;
- Identify and examine factors influencing the use of the Intranet in knowledge management and what make some organisations utilise the Intranet better than others.



### 1.4 Research Questions

Understanding the implementation and impact of the Intranet and the identification of factors that make one organisation flourish while others struggle with the same IT system is of interest and important to practitioners and researchers. Practitioners' main concerns are with costs and benefits associated with Intranet adoption. Researchers are interested in theoretical models investigating the use of the Intranet and factors that influence the use of the Intranet in knowledge management.

Answering the following questions is the main motivation of the research:

- What are the uses of the Intranet in Omani organisations?
- Does the Intranet provide benefits to Omani business organisations?
- What impact does the Intranet have on knowledge management?
- Which factors influence the use of the Intranet in knowledge management and make some Omani organisations use the Intranet more effectively than others.

### 1.5 An Overview of the Intranet

#### 1.5.1 Definition.

The term Intranet lends itself to many definitions and interpretations. Some researchers used a broad term to include the Extranet in the definition, for example Scott, (1998) while others differentiate between Intranet and Extranet, for example, Harvey et al (1998) and Kim (1998). According to Harvey et al., (1998, p.348) *“the Intranets are intra-organisational networks based on Internet technology. Intranets provide users with access to available information throughout an organisation, communication via electronic mail, and the ability to publish and disseminate information without knowledge of specific programming languages or systems”*.

Another definition given by Curry and Stancich (2000, p.151) *“Intranets are private computing networks, internal to organisation, allowing access only to authorised users. They may include an internal web along similar lines to the World Wide Web with multiple websites and web pages, electronic mail, newsgroups, online meeting facilities and any*

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*number of applications*". This definition is similar to the definition given by Harvey et al (1998), however it differs in the security aspect of the Intranet. In Harvey's definition there is no mention of security while the definition given by Curry and Stancich emphasises security.

From different definitions and interpretations given to the term Intranet, the definition of the Intranet in the context of this research is a corporate (private) network based on the use of the Internet technologies<sup>1</sup> for:

- Communications;
- Knowledge and resources sharing;
- Collaboration in work;
- Information and knowledge access, retrieval and publishing.

By the use of common Internet protocols, or core technologies, in conjunction with their own business applications, companies can easily communicate, distribute information and facilitate project collaboration across the entire enterprise (Davies, 2000; Gonzalez, 1998).

### **1.5.2 Why Intranet?**

The Intranet has been chosen for knowledge management activities by many organisations due to the following reasons:

- Easy to use and inexpensive technology which makes it very attractive, especially for developing countries such as Oman which suffers from lack of funds and a trained workforce.
- The Intranet is an appropriate tool for knowledge management because it can support rich information, which includes not only text, but also graphics, audio, and video clips.

---

<sup>1</sup> Universal Resources Locators (URLs) its function is to specify the location of server which contains the addresses of digital objects, such as documents, images, sound and video (Gonzalez, 1998)

Hypertext Markup Language (HTML) is the language to write a Web Pages that can be understood by Web Browsers (Gonzalez, 1998).

Hypertext Transfer Protocol (HTTP) used for transferring information between Browsers (e.g. Netscape) and servers.



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The Intranet based technology *"is very intuitive technology, and deals easily with audio, graphics, and video representation of knowledge"* (Davenport and Prusak, 1998, p.133).

- The Intranet provides an easy way to update and maintain knowledge as change occurs. Unlike for instance manual systems, which are calendar driven due to cost (Hills, 1998; Scott, 1998; Telleen, 1998).
- It is easy to access, share information and knowledge from and between heterogeneous systems. This gives the company the flexibility and purchasing power to buy hardware and software from vendors that suite the company's needs without much fear of incompatibility issues arising (ibid).

The justifications for the Intranet adoption in comparison to other systems include the economic justification based on enterprise-wide dissemination of information which allows communication between dissimilar hardware, software, and networks. This facilitates information sharing across different functional areas, divisions, and organisations (Davis, 2000, Harvey et al., 1998; Kim, 1998; Scott, 1998). In addition an Intranet is an extremely intuitive and easy to use and interface (Bernard, 1998; Devonport and Prusak, 1998; Telleen, 1996). It is relatively inexpensive to install and maintain (Harvey et al., 1998) and security is based on firewalls whose main objective is to protect the company applications and confidential information from unauthorised users (Blanning and King, 1998; Gonzalez, 1998; Olin et al., 1999).

### **1.5.3 Security of the Intranet**

With respect to security there are two main issues; allowing authorised people access to relevant information and preventing access to others (Went, 1998).

Security is a major concern in implementing the Intranet, especially when dealing with sensitive information. The primary concern is the outside intruder (e.g. hackers, spies, commercial competitors etc) who may connect to the Internet and try to enter the local network. However, with a firewall, which works as a gatekeeper, outsiders can be prevented from entering the company network (Blanning and King, 1998). A further consideration is unauthorised employee access to sensitive information. This can be disruptive within a company and give rise to management concerns. The system

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administrator can give employees’ access to different applications and information according to work needs. In practice, due to a solution which facilitates monitoring and controlled of access this problem is reasonably well controlled. According to Blackwell (1998); Gonzalez, (1998); Went, (1998) the Intranet has adequate security unlike the Internet, which is relatively unsafe. Blackwell (1998) has compared Intranet to the Internet in terms of security and the results are given in Table 1.1.

	Intranet	VS	Internet
System	Closed		Open
Information	Private		Public
Structure	Application dependent		Application independent
Security	Potential false sense		Accepted as unsafe
Controls	Access control		Transaction control
Protection	Integrity, confidentiality		Non-confidential

**Table 1.1: Developed by Blackwell (1998)**

The differences between the Internet and the Intranet can be summarised as follows:

- The Internet is intended to be open for anyone and confidentiality is not an issue, where the Intranet is open only for authorised people. Information on the Intranet is protected by a firewall to prevent unauthorised intruders.
- The information on the Intranet is private (can be accessed only by authorised people) where the information stored on the Internet can be accessed by the public (anyone can access the information provided that he has an Internet connection). This is one of the primary distinctions between the two.



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- The security of the Intranet is applications dependent (for confidential information and applications, higher level of security can be applied).

With recent firewall<sup>2</sup> technology, there is less worry about the security of the Intranet. Furthermore, firewalls are considered *"an effective mechanism for enforcing a security policy between an organisation's internal systems and the external world. Security policies implemented through firewalls determine which inside services may be accessed from outside, and even who internally has access to that information"* (Olin et al., 1999, p.341). Furthermore, encryption, which involves the encoding of a message so that only the intended recipient can decode via encryption software, can be used where firewalls technology is not enough.

### 1.6 Knowledge Management (KM)

Quintas et al (1997, p.387) have identified several points in relation to the definition of KM:

- *"Ensuring that knowledge is available at a precise location where it is most crucial for decision making;*
- *Ensuring that knowledge is available when it is needed for a business process;*
- *Supporting the acquisition of knowledge from external sources, and developing the capability to assimilate and utilise knowledge;*
- *To ensure that new knowledge is distributed to those people in the organisation who perform activities on the basis of new knowledge (e.g., distribution of lesson learned);*
- *To ensure that everybody in the organisation knows where knowledge is available within the organisation or network of organisations".*

---

<sup>2</sup> A firewall is a software/hardware product that prevents the unauthorised access or flow of information across an electronic barrier.



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The second definition which links knowledge management to advanced technology is offered by O'Leary (1998, p.34) who asserts that KM is "*the formal management of knowledge for facilitating creation, access, and reuse of knowledge, typically using advanced technology*". Another knowledge management definition, which seeks to consolidate the capacity of information technology with the creativity of human beings, is offered by Malhotra (1998). In his own words:

*"Knowledge Management caters to the critical issues of organisational adaption, survival and competence in face of increasingly discontinuous environmental change.... Essentially, it embodies organisational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings"*. Yogesh Malhotra, Ph.D. 1998

<http://www.brint.com/KM>.

In this definition, the emphasis has been shifted from IT/IS systems as drivers of change to a perspective where these technologies are regarded as tools which may provide a new potential for combining the information embedded in IT/IS systems with the creative potential and knowledge embodied in people.

In short, knowledge management is the process of making information and knowledge easily accessible to the right people in the right place at the right time. In addition to the technology, management commitment and support is required. Furthermore, initiatives to train, involve, reward, and encourage knowledge workers and to promote an organisational culture based on the use of the Intranet, as an essential source for knowledge management activities is important. A holistic view, which combines the technology and human and organisational factors, is required in the implementation and the use of the Intranet in knowledge management.



### **1.7 The Needs for Knowledge Management**

Modern organisations have embarked on knowledge management programmes due to environmental pressure, technological advancement such as the Internet and Intranet, the ability to create valuable information and globalisation and geographical dispersion (Carayannis, 1999; O'Leary, 1998). In addition teamworking and collaboration are amongst the reasons for knowledge management initiatives in many organisations. Furthermore, knowledge management enables organisations to identify their core competencies and essential sources of expertise, which help them to learn from and avoid the mistakes of the past (Nottingham, 1998). Indeed, these reasons forced modern organisations fundamentally to revise the way they manage their information and knowledge. Empirical studies have suggested that companies using information technology to manage knowledge have achieved a fruitful result. Benefits such as cost saving, increased productivity, improved business processes and cultural transformation have been reported (Earl, 1994; 1998; Davies, 2000; Kim, 1998; Hills, 1998; Scott, 1998). The organisations have used various knowledge tools to manage knowledge and the Intranet is one of the most important tools that have been used (Davenport and Prusak, 1998; Davies, 2000; Metes et al., 1998; O'Leary, 1998).

### **1.8 Background Information about Oman**

#### **1.8.1 Location and Population**

Oman is the third largest country in the Arabian Peninsula, occupying an area of 309,500 km<sup>2</sup>. It is located at the south-eastern part of the peninsula. Oman has a coastline which extends 1,700km from the Strait of Hormuz in the north, to the borders of the Republic of Yemen in the south and overlooks three seas - the Arabian Gulf, Gulf of Oman and the Arabian Sea. Oman borders Saudi Arabia and the United Arab Emirates in the West; the Republic of Yemen in the South; the Strait of Hormuz in the North and the Arabian Sea in the East (see Figure 1.1) .It has an estimated population of 2.3 million and the birth rate is about 3.5%. Total Gross Domestic Product (GDP) in 1999 is about 6011.3 million Rial



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Omani (R.O) and the average per capita GDP (per person) is of around 2586 (RO). The Rial Omani is equal to US\$ 2.58 (1 R.O. = US\$2.58)( Oman'99, 1999).



**Figure 1.1: Shows the Location of Oman**

Oman enjoys a stable political, economic and social system. The excellent relations with neighbouring and non-neighbouring countries have enabled Oman to play an active role in promoting regional, political and economic co-operation.

### 1.8.2 The Omani Private Sector

The focus of research is on the impact of using the Intranet in knowledge management in Omani private sector organisations. The concept of the private sector is based on the criteria of private ownership of the firms that engage in various business activities. The scope of private sector in Oman can be extended to include some organisations which have mixed public and private ownership.



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In recent years the Omani government has emphasised the role of the private sector in the economic development of the country. The government plans are for the privatisation of some public departments and agencies. *"Another fundamental transformation in Oman's fortunes is taking place with the private sector replacing the public sector as the vehicle for progress and prosperity"*(Oman'99, 1999, p.9). The government with the leadership of His Majesty Sultan Qaboos Bin Said has emphasised the role of the private sector in the economic development of the country. According to His Majesty *".. The private sector currently represents the economic foundation of all countries. Through its competitive and versatile nature, the private sector enhances the solid base for Government and citizens alike"* (Vision for Oman's Economy, 1995, p.5).

His Majesty the Sultan has always encouraged market-oriented policies and private sector development as the mechanism for prosperity and growth. Since His Majesty took over as the Sultan in 1970, the salient feature of Oman's development strategy was to establish a free competitive economy with equal opportunities for all. In 1995, the Vision Conference; "Oman 2020" was held with the aim of moving the economic development in the country to higher level of growth and prosperity. The aims were:

- Economic and financial stability;
- Reshaping the role of the Government in the economy and broader private sector participation;
- Globalisation of the economy;
- Human resource development and upgrading the skills of the Omani workforce.

### **1.8.2.1 Why the Omani Private Sector?**

Around 65% of the Omani economy is dependent on oil with oil reserves guaranteed to last for at least 40 to 50 years. However, oil price fluctuations (1985 at over \$20 a barrel to \$ 9 a barrel in 1998) have led the government to diversify the country's economic base, led by the private sector (Oman'99, 1999). It is expected that in 2020 the crude oil sector's share of

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GDP will drop to only 9% and non-oil sectors in the GDP to increase to 91%. The private industrial sector is expected to rise from 7.7% in 1996 to 30% in 2020 (Oman'99, 1999).

In order to achieve this objective the private sector has to rely on information technology and transfer technology to produce high-value-added products.

Another important development is that the government of Oman is joining the World Trade Organisation (WTO), thereby eliminating any restriction or barriers, which favours the Omani companies. Therefore, in order for Omani companies to compete successfully they have to rely on information and knowledge and manage their knowledge more effectively and to utilise information technology to achieve competitive advantages.

The current Five-Year Plan (1996-2000) calls for *"a wider public and private sector participation, the use of sophisticated computerised macro-economic modelling techniques and planning Oman's development within a regional and global context"* (Oman'99, 1999, p.94).

The process of adopting computerised IT systems was started in 1972 by government ministries and soon followed by private organisations in the country. In recent years computerisation has spread very rapidly, especially in the private sector organisations. Internet technologies started spreading on a larger scale in 1996. OMANTEL is the sole access provider in Oman, however, it has appointed some 30 dealers through whom the public can obtain a connection to the Internet. Table 1.2 shows that there were more than twenty thousand subscribers connected to the Internet in Oman at the beginning of 1998 and this number is increasing very rapidly.



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Country	July 1997	November 1997	December 1997	Beginning 1998
United Arab Emirates	15250	27000	32201	88552
Bahrain & Saudi Arabia	13000	16000	16923	46538
Lebanon	12000	15000	15938	43828
Egypt	12000	14500	15255	61021
Oman	3860	6490	7595	20888
Jordan	4000	6000	7350	20213
Qatar	2800	5185	6289	17295
Tunisia	N/A	1400	1750	2993
Yemen	920	840	882	2426

**Table 1.2: Shows Number of Internet Users in Some Arab Countries 1998**

Source: Internet Al-aalam Al-Arabi, January (1998, p.28)

With Leased Line commercial access to the Internet different bandwidth can be selected ranging from 64K, 128K, 256K, 2Mb and even greater if required. The price of Commercial Leased Line Access is as follows:

Speed (kbps)	Setup Fee (R.O.)	Upgrade Fee (R.O.)	Monthly Fee (R.O.)*
64	200/-	N/A	800/-
128	200/-	100/-	1375/-
256	200/-	100/-	2696/-
512	200/-	100/-	5393/-
1024	400/-	200/-	8988/-
2048	400/-	200/-	13482/-

\* Special 30% discount for educational, medical, social & Youth activities sectors on the Internet Leased Lines.

**Table 1.3: Shows Different Prices of Commercial Leased Line Internet Access**

Source: <http://www.gto.net.om/new/access.html>



## **Chapter One**

In developing countries such as Oman the introduction of information technologies is very recent and its use and impact have not been systematically assessed and evaluated. Despite the importance of this subject to researchers and practitioners, the issue of evaluating and assessing the benefits of the Intranet is still an area which requires further and vigorous research (Blanning and King, 1998; Scott, 1998).

Traditionally the preferred way of communication and knowledge conversation within Omani organisational context is the face to face meeting (Al-Harthi, 1998). Furthermore, the Omani organisational hierarchical structure is characterised by its rigidity and consequently information flows from top to bottom. However, recent literature suggests the Intranet has flattened organisational hierarchy (Scott, 1998).

The subject of managing knowledge using IT has been of interest to the author of this document since 1986. At the time, the author was a member of the professional IT staff of Sultan Qaboos University. While involved in using IT to manage knowledge as the deputy director for the Computer Centre, the author realised the need for a new and holistic approach, different from an IT-centric approach, that combined the IT, human and organisational factors to manage knowledge.

It is recognised at this point that the traditional theoretical approach that emphasises IT while ignoring factors which affect the use of IT does not necessarily provide satisfactory complete understanding, and that new alternatives should not be ruled out. The alternative approach is one that takes into account human and organisational factors in the implementation of IT.

In summary, the reason for the selection of the Omani private sector as the focus of this research is due to the important role it plays in Oman's economic, industrial, and technological development. Despite this little research has been carried out to investigate the impact of the Intranet on this sector. All of this has made the selection of the impact of the Intranet on knowledge management on the Omani private sector as a topic worthy of more detailed research for this Ph.D. thesis.



### 1.9 Methodology and Research Methods

Without going into details at this stage, the present research has developed a research model, which reflects the declared objectives. This study uses a **Declared and Validated** approach to derive the research model. The **Declared and Validated** approach, cautions blindly undertaken fieldwork, therefore a literature review was undertaken and occupies chapter 2 and 3. However, the **Declared and Validated** approach doesn't totally rely on the literature review, but recommends testing the results, therefore, two mini-case studies and a pilot survey were conducted to validate the research model. Chapters 4 and 5 detail this process.

A quantitative survey was used as the main means of collecting data, in addition a qualitative element two mini case studies was used to test the validity of the proposed model and inform the final detailed case study. The findings of the study are mostly based on 80 participants (mostly IT directors) representing 40 Omani private sector organisations that have adopted the Intranet and agreed to participate in the study and detailed single-case study. Statistical software like Microsoft Excel and a Statistical Package for Social Science known as **SPSS** were used to analyse the data collected. Statistical techniques such as correlation analysis and regression analysis were used to analyse the data. An overview of the research is given diagrammatically in Figure 1.2.



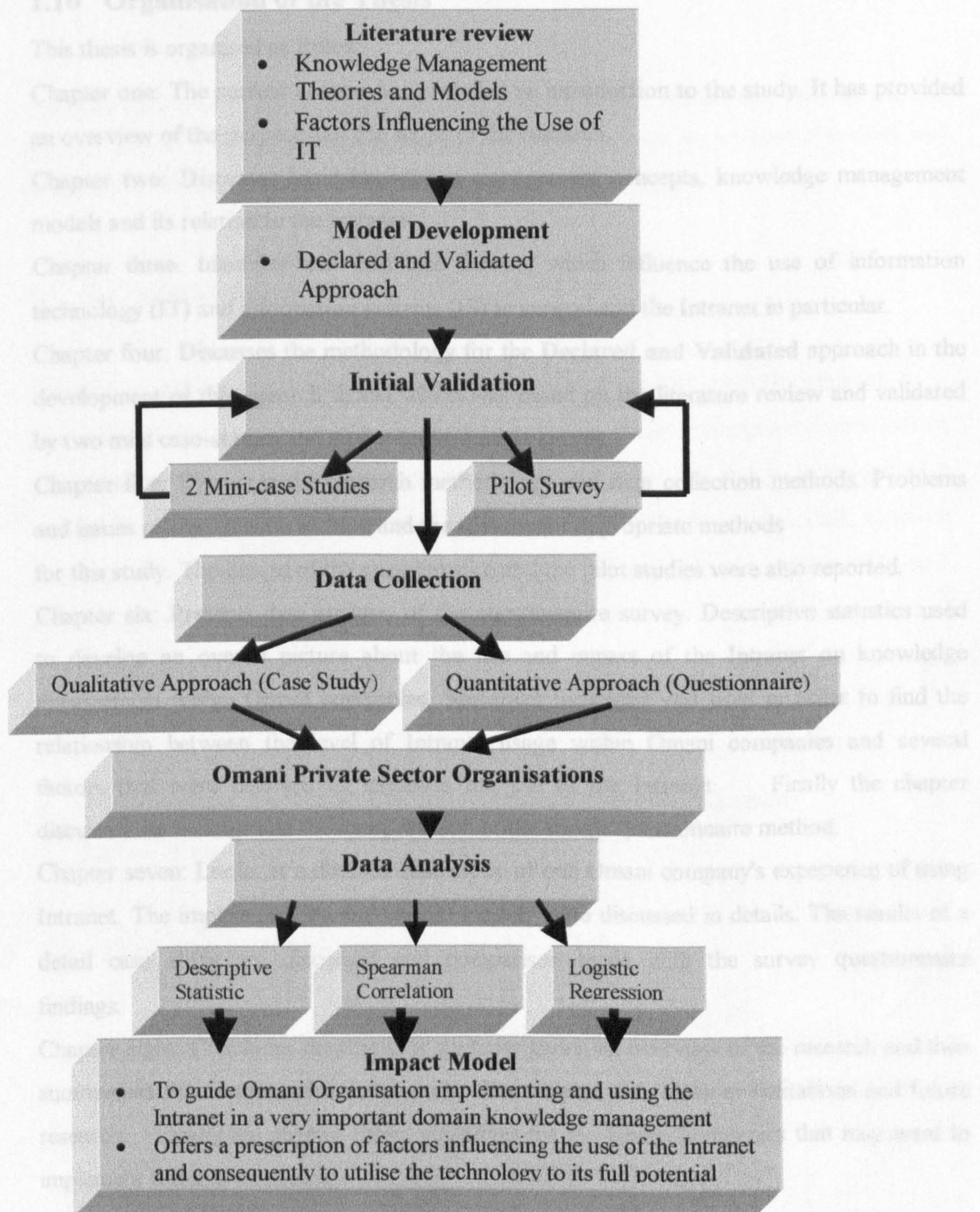


Figure 1.2: Shows an overview of the research



## **Chapter One**

### **1.10 Organisation of the Thesis**

This thesis is organised as follow:

Chapter one: The current chapter has provided an introduction to the study. It has provided an overview of the purpose and the scope of the research.

Chapter two: Discusses basic knowledge management concepts, knowledge management models and its relation to the Intranet.

Chapter three: Identifies and examines factors, which influence the use of information technology (IT) and information systems (IS) in general and the Intranet in particular.

Chapter four: Discusses the methodology for the **Declared and Validated** approach in the development of the research model which was based on the literature review and validated by two mini case-studies and a pilot questionnaire survey.

Chapter five: Discusses the research methodology and data collection methods. Problems and issues related to each method and the reasons for appropriate methods for this study. The design of the questionnaire and the pilot studies were also reported.

Chapter six: Presents data analysis of the questionnaire survey. Descriptive statistics used to develop an overall picture about the use and impact of the Intranet on knowledge management within Omani companies. Spearman technique was used in order to find the relationship between the level of Intranet usage within Omani companies and several factors that were believed to influence the use of the Intranet. Finally the chapter discusses the findings and the interpretation of the survey questionnaire method.

Chapter seven: Looks at a detailed case study of one Omani company's experience of using Intranet. The implementation and impact models were discussed in details. The results of a detail case study are discussed and comparison made with the survey questionnaire findings.

Chapter eight: Concludes the thesis. It starts by giving an overview of the research and then summarises the contribution of the study. The chapter also looks at limitations and future research. Finally the chapter offers guidelines for the Omani companies that may want to implement Intranet technology.

## **Chapter Two**

### **Knowledge Management Concepts**

**“Intranets have mushroomed to become bigger in terms of number of users than the public-access Internet, as well as being the main repository and delivery system for knowledge working and virtual teams” Ryan Bernard (1998)**

#### **2.1 Introduction**

Chapter one has provided an overview of the purpose and the scope of the research.

The purpose of this chapter is to introduce some knowledge management concepts to strengthen our understanding of knowledge management issues and to investigate the relationships between the Intranet and these issues. Furthermore, some models, in which companies have used the information technology (IT) and information system (IS), as a strategy to manage their knowledge, are discussed. The body of literature, which is of direct relevance to the research, is:

- Knowledge management concepts and theories;
- Models that are dealing with the use of IT in knowledge management;
- The use of the Intranet in the area of knowledge management;

#### **2.2 Knowledge Definition**

A good starting point is the definition of knowledge. However, knowledge is not easy to define and many definitions supplied in the literature are context specific and highly ambiguous. In the recent literature, many interpretations have emerged which offer markedly different understandings of the definition of knowledge.

According to Earl (1998, p.39) knowledge is *“what we know, or what we can accept we think we know and has not yet been proven invalid, or what we can know”*. Similarly Liebeskind (1996, p.94) defined knowledge as *“information whose validity has been*



## Chapter Two

*established through tests of proof*". It can be implied from the above definitions that knowledge is information whose validity has not been proven invalid. Woolf (1990) defined knowledge as organised information applicable to problem solving. The definitions are relating knowledge to the validation and the organisation of information. However, Nonaka (1994, p.15-16) defined knowledge as a "*justified true belief*". This interpretation of knowledge is a classical epistemology, which sees knowledge as more of a human process. Furthermore, Nonaka (1994) asserts that information is a necessary medium for initiating and formalising knowledge.

### 2.2.1 Types of Knowledge

Earl (1998, p. 41-43) divided knowledge into three types according to its level:

- Science, which is the "accepted knowledge", published, "tested definitions", facts and theorems available in printed media.
- Judgement which is a "*workable knowledge*", (for example policy rules, probabilistic parameters and heuristics). *Judgement is less certain than we might call science. It is more private, local and idiosyncratic*".
- Experience which is a "potential knowledge" (for example transactions, history and observation).

Furthermore, Earl (1994; 1998) related the (above) three different types to data, information and knowledge. "*The lowest level is the equivalent of transaction data (and transaction processing systems). The middle level is equivalent of information in the classical sense of reducing uncertainty to make a decision. The highest level is knowledge*" (Earl, 1998, p.41). Similarly Martensson (2000, p.213) considered explicit knowledge and information as synonymous. In his words "*explicit knowledge is identical to information; it can be easily stored outside the human mind (e.g. in databases)*".

Nonaka (1991; 1994) made distinction between two types of knowledge:

- Explicit knowledge which can be expressed in words and can be acquired from libraries, databases, archives, telephone conversations, meetings, memos, IT and IS (Carayannis, 1999; Choo, 1998; Heldlund, 1994; Nonaka, 1991; 1994). Explicit knowledge can be easily articulated and consequently captured, stored and



disseminated. According to Martensson (2000, p.209) explicit knowledge is "*what can be captured and shared through information technology*". It can be inferred that explicit knowledge in Nonaka's definition (1991, 1994) is equivalent to data and information as in Earl (1998).

- Tacit knowledge is that which is difficult to express in words or communicate (Bensaou and Earl 1998; Carayannis, 1999; Inkpen, 1998; McBride, 1994; Nonaka, 1991; 1994). Tacit knowledge is personal, hard to articulate and share.

However, another type of knowledge, codified knowledge that is stored in information systems that can be shared and updated can be added to Nonaka knowledge classification. In summary knowledge is the repository of what has been already learned. It may be explicit, as in books, memos, databases or Intranet contents, or it may be tacit as in relationships and processes that is hard to articulate and document. This research is mostly limited to the management of explicit knowledge.

**Knowledge<sup>1</sup>** can be broadly defined in the context of this study as; what people know, what can be published, updated, communicated, or shared, on the Intranet, whether in text, graphical, animated, video or audio clip form. It can include facts, rules, models and concepts that underpin the day to day decision made at every level of the organisation. Knowledge management (as defined in chapter one) involves a set of activities associated with acquiring knowledge from external and internal sources, publishing, storing, and distributing it to relevant members of the organisation.

### 2.3 Enabling Conditions

The theory of organisational knowledge and knowledge management states that five conditions are necessary to facilitate the transfer of explicit and implicit knowledge from an individual to a group and eventually to the organisation levels (Nonaka, 1994; 1998; Scott, 1998). In the following sections each condition is discussed in detail:

---

<sup>1</sup> Where ever the word 'information' appears in this thesis it means a middle level of knowledge according to Earl's (98) classification.



### **2.3.1 Intention**

This is the first enabling condition for knowledge generation, and encapsulates how people in the organisation view and approach the world and make sense of the surrounding environment (Nonaka, 1994). Firms publicise their intentions and vision through their mission statement and their rules and standards (Scott, 1998). With intention it is possible for employees to judge the value of incoming messages and to interpret the message by reference to the organisation's mission, rules, regulation, norms and culture. It is very important that everyone in the organisation is aware of the company's intentions, in order to distinguish between what is correct and incorrect in context. New knowledge is totally dependent on an individual's understanding of the organisation's intention and the interpretation of the incoming messages in accordance or (reference) to this intention.

Companies, especially in the western countries, are taking advantage of using the Intranet to publicise their vision, mission, and messages from organisation leaders and other decision-makers to inform not only their employees, but also customers and partners (Scott 1998). The Intranet enables visionaries within the organisation to publicise knowledge about business strategy and objectives. This allows a wider audience of employees, customers and business partners, regardless of barriers of location and time difference, to be reached in a cost effective manner. Consequently the Intranet may enable employees to develop new ideas by scanning the environment for facts, trends and even rumours that may indicate an opportunity or potential problems for the company. After all these employees are expected to identify and analyse relevant information, discard what is not significant, and actively share their discoveries with colleagues.

### **2.3.2 Chaos and Fluctuation**

Chaos means discontinuity (Nonaka, 1994) which is considered another enabling condition for organisational knowledge generation (Nonaka, 1994; Scott, 1998). Some items of information will remain relevant for a long period of time, while others will become outdated very quickly. Failure to update the obsolete information will cause people to act on misinformation and false intention. Information published on the Intranet needs to be current and frequently updated due to the dynamic business



environment. This creates a kind of chaos but is creative in the sense that it enables enhancement and modification of the information posted over the Intranet. This frequency of modification and updating contributes to the breakdown of employee habits and routines. The hope is that this triggers creative chaos and stimulates interaction in a fluctuating environment (Nonaka, 1994; Scott, 1998).

### **2.3.3 Autonomy**

Autonomy in this context is the flexibility of acquiring, relating and interpreting information (Nonaka, 1994; Scott, 1998). Autonomy is needed to encourage employees to acquire information, via the Internet and Intranet, and to share their ideas and knowledge with colleagues and experts. This kind of autonomy may motivate the employees and generate viable ideas (Scott, 1998).

It can be argued that too much autonomy can create unnecessary duplication and inconsistency, which might have a negative impact, while strict management control could threaten individual autonomy and stifle creativity.

A balanced approach between too much autonomy and control is an issue for the management to consider. For example this approach allows a firm to adjust frequently the mix of freedom and control to achieve innovation and flexibility (Graham and Pizzo, 1996). An example of this balance is used at Sun Microsystems, which allows its employees to create web sites with provided templates, which assures both consistency and control standards (Scott, 1998). Another example of a balanced approach is a computer company in Oman, which encourages employees to contribute to its corporate knowledge by publishing items on the corporate Intranet, however, prior approval is required before information is posted (see Chapter Four).

### **2.3.4 Redundancy**

Redundancy is the deliberate redundancy of organizational information, business activities and managerial responsibilities (Nonaka, 1994). This is an important concept in knowledge management, which can be supported by the use of the Intranet through a central knowledge depository and discussion groups. Redundancy is considered to be unwise duplication and waste by many Western managers, however, it plays a crucial



role, particularly in knowledge development, in the Eastern culture (Nonaka, 1994). This concept can offer an overlap in knowledge between different departments, and groups that promote cross- functional collaboration. Wide access to information via the Intranet allows deliberate redundancy in knowledge, yet it cuts costs in paper, mailing and distribution (Scott, 1998).

### 2.3.5 Requisite Variety

Requisite Variety may be interpreted as *“the constructing of information process channels that match the information load imposed by the environment”* (Nonaka, 1994, p.29). Therefore it is essential for individuals within an organisation to be given access to information with the minimum number of steps. Information that can help employees know who is the right person to go to for help, who can solve a particular problem and who owns the information. Consequently to provide the right information in order for employees to respond to the challenge provided by the business environment but not to be overloaded with information according to both Nonaka (1994) and Scott (1998).

According to Harvey et al (1998); Gonzalez (1998); Scott, 1998), the Intranet can address both issues. On the one hand while being a knowledge repository, it allows group discussion and the ability to connect to experts (at different locations and time zones) who can respond to the challenge provided by the business environment. On the other hand it can prevent overload, because it is based on "pull" (whenever information is needed) not "push" technology. The Intranet enables users to exclude unwanted information, including information of conceivable value, and focus on information which is appropriate to specific ideas or facts.

## 2.4 Knowledge Conversion Modes

The conception of knowledge management and knowledge conversion from individuals to group and then to organisational level in Nonaka's (1994) model concentrates on tacit knowledge which is deeply rooted in an individual's experience, actions, ideals, values, or emotions. The characteristic of tacit knowledge according to Nonaka (1994) is highly personal and hard to formalise and communicate. Nonaka has suggested that knowledge



is created and transferred from individuals to group and to organisational level through four different modes:

### 2.4.1 Socialization

Socialization which involves the conversion of individual tacit knowledge to group and eventually to organizational tacit knowledge through sharing experience (Nonaka, 1994). Tacit knowledge is hard to express and takes a longer time to gain in comparison to explicit knowledge (Bensaou and Earl, 1998; Choo, 1998; McBride, 1994; Jordan and Jones, 1997; Nonaka, 1994; Scott, 1998). To convert this type of knowledge from individuals into organizational knowledge through traditional IT can be problematic (Nonaka, 98; Scott, 1998). However, modern IT through the use of such features as animation, graphics, audio, video and chat features which are supported by the Intranet may help to facilitate socialization (Scott, 1998).

### 2.4.2 Internalisation

Internalisation is the process of converting explicit knowledge to tacit knowledge (Nonaka, 1994; Choo; 1998; Scott, 1998). Trial and error and experimentation could bring about tacit knowledge (Scott, 1998). For example, one company, namely Sun Microsystems the Supply Planning Group, uses the Intranet to support assumptions and definitions for interactive plans using trial and error to enhance data analysis and decision making processes (Scott, 1998). Furthermore, Scott, (1998) states that using animation, three-dimensional graphics, audio, video, chat features and simulation which are supported by the Intranet may help to facilitate internalisation (Scott, 1998). This view is also supported by Nonaka et al, (1998, p.680) who observe that modern *“IT increasingly offers the opportunity to provide knowledge-rich training facilities that help to internalise explicit knowledge. For example, pilots learn how to fly in a virtual space before flying in reality through simulation”*. Harvey et al., (1998) argue that in order for meaningful dialogue, trial and error and experimentation to take place, an organisation's culture must allow, and promote such activities.



### **2.4.3 Externalisation**

Externalisation is the conversion of the tacit knowledge to articulated knowledge (Nonaka, 1994; Choo, 1998). This conversion is very difficult due to the fact that tacit knowledge is hard to express, communicate, and encode (Choo, 1998; McBride, 1994; Nonaka, 1994; Scott, 1998). Nonaka (1994) suggests a sequential round of meaningful dialogue, where metaphors (which means experiencing one thing in relation or reference to another) or models can be applied to enable groups and individuals to articulate their own viewpoint (Nonaka, 1994). This kind of idea has been widely used in information systems to understand and to externalise sticking user requirements through prototyping (Scott, 1998).

Scott also suggests ways to articulate implicit knowledge, these include the use of three-dimensional graphics, animation, video and audio clips, virtual reality and other technologies which can enhance the presentation of prototypes on the Intranet. Traditional technologies have supported only explicit knowledge transfer. However the case is different with Intranet technology which, through its multimedia, hypertext capabilities support and facilitates tacit knowledge transfer and externalisation of tacit knowledge to explicit knowledge (Davenport and Prasuk, 1998; Scott, 1998).

### **2.4.4 Combination**

Combination is the process of collecting, organising and acquiring explicit knowledge from various sources (Choo, 1998, Nonaka, 1994). Individual knowledge could be shared with groups and converted to organisational knowledge (Scott, 1998). Existing computers and information system databases may be used to organise, categorise and store knowledge in many ways to produce new explicit knowledge (Choo, 1998; Nonaka, 1994; Jordan and Jones, 1997). The Intranet enables the use of hyperlinks to bring together information from extremely diverse sources and combines them in such a way that new ideas are enabled to emerge. Thus individual and group knowledge can be exchanged and combined to induce innovation and creativity in an organisation.

From the above discussion, the conclusion is that the traditional IT model, apparently, may have greater role in 'combination', which involves combining different bodies of explicit knowledge, and 'internalization', which involves knowledge transfer through



verbalizing or diagramming into documents, manuals and stories. However, modern IT, such as the Intranet, may have a greater role in other conversion modes.

### 2.5 Knowledge Management Models

This section presents knowledge management models where companies are using IT to manage knowledge. Each model is discussed in the following sections.

2.5.1 A knowledge management model developed by Hansen et al (1999) is presented in Figure 2.1. It is based on a study of consulting companies using information technology as a strategy to manage their knowledge. The model can be summarised in the following points:

- A competitive strategy that the firms follow depends on the codification of knowledge. Knowledge is that which is stored in information systems and can be shared and, updated. This enables *"high quality, reliable and fast information systems implementation by reusing codified knowledge"* (Hansen et al., 1999, p.110).

The main purpose of the codification process according to Davenport and Prusak (1998) is to put organisational knowledge into a form that makes it accessible to those who need it.

- An economic model which depends on economic reuse. The strategy is to invest once and reuse many times. As many people use the knowledge over time then the average cost goes down. For example *"once a knowledge asset-software code or a manual is developed and paid for, it can be used many times over at very low cost"* (Hansen et al., 1999, p.110).
- A knowledge management strategy, which is based on using information technology to codify, store and disseminate knowledge to people.
- An information technology strategy which is based on heavy investment in IT. The goal is to connect people with reusable codified knowledge that exists in the IT systems (Hansen et al., 1999).
- A human resource strategy which is based on hiring new graduates, because they have the potential to use knowledge and provide solutions. However, organisations



need to train and reward them in order to enable them to contribute significantly to organisational knowledge. (Hansen et al., 1999).

Codification is useless without the ability of people accessing that knowledge and using search tools to extract what is needed. By codifying knowledge of the company and letting those people who access it try out ideas, knowledge and experience is gained in a much more efficient manner than through years of trial and error. This is the hallmark of good knowledge transfer.

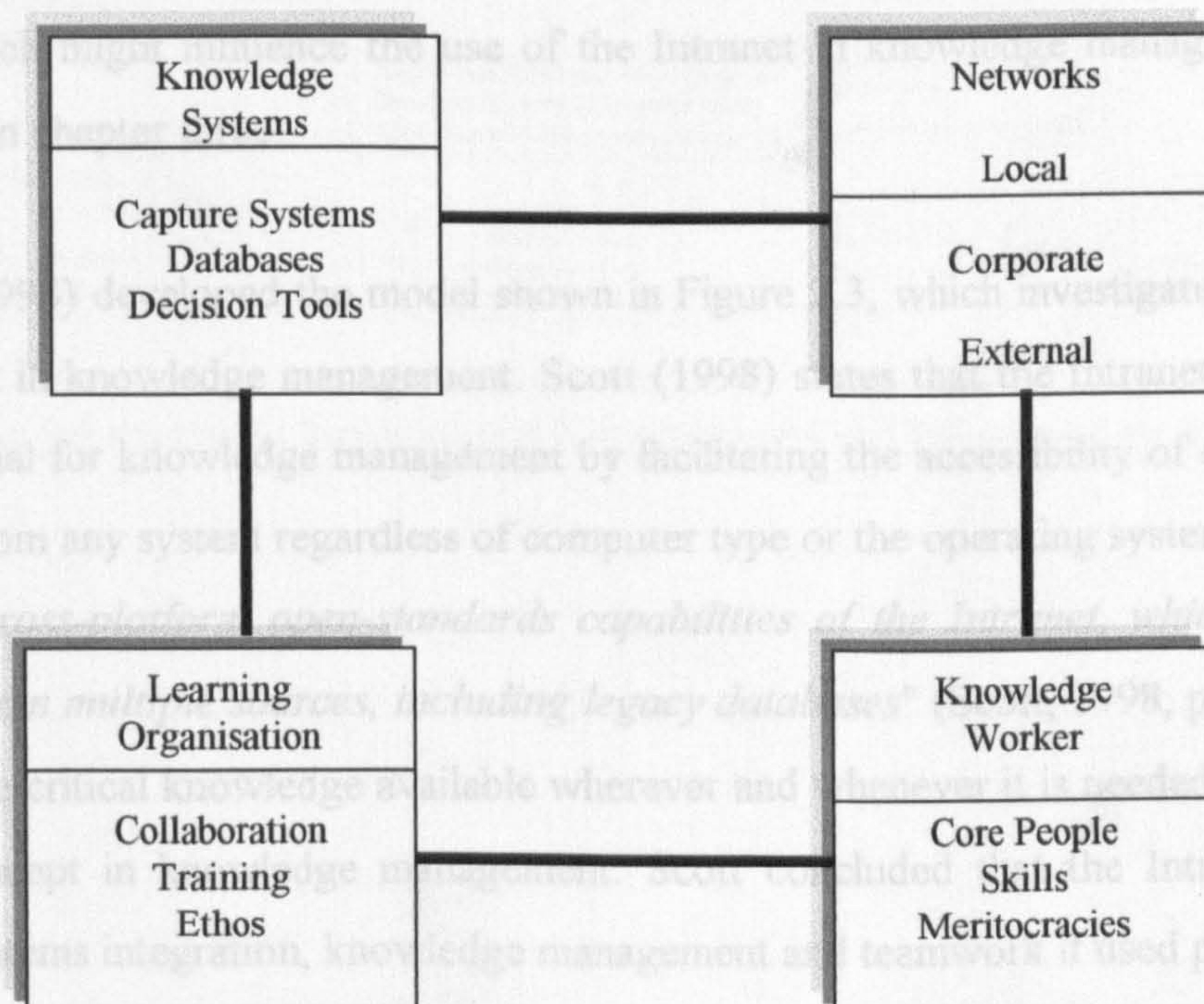
<b>Codification</b> Provide high-quality, reliable, and fast Information-systems implementation by reusing codified knowledge	<b>Competitive Strategy</b>
<b>Reuse Economics:</b> Invest once in knowledge assets; Reuse it many times. Use large teams with a high ratio of associates to partners. Focus on generating large overall revenues.	<b>Economic Model</b>
<b>People to Documents;</b> Develop an electronic documents system that codifies, stores, disseminates, and allows reuse of knowledge	<b>Knowledge Management Strategy</b>
<b>Invest heavily in IT;</b> the goal is to connect people with reusable, codified knowledge.	<b>Information Technology</b>
<b>Hire new college graduates</b> who are well suited to the reuse of knowledge and the implementation of solutions. <b>Train people</b> in groups and through computer-based distance learning. <b>Reward people</b> for using and contributing to document databases.	<b>Human Resources</b>
Andersen Consulting, Ernst & Young	<b>Examples</b>

Figure 2.1: Knowledge Management Model Developed by Hansen et al (1999)



**2.5.2** Earl (1994, 1998) carried out an in-depth study on two companies, namely Skandia International and Shorko Films, which resulted in the knowledge management model shown in Figure 2.2. The case study clearly shows how Skandia and Shorko have successfully utilised information technology to manage knowledge. Skandia and Shorko are using IT expert systems and networks to capture, codify and distribute knowledge in a way which makes it available to a wider audience. The model combines technology and other factors ('social actions') and shows how the interaction of these elements plays an important role in knowledge management.

Earl argues that technology alone can not do the job. “ *This inductive analysis also suggests that knowledge-building is a multifaceted endeavour. At its simplest, it requires a combination of technology and social actions*” (Earl, 1998, p.45).



**Figure 2.2 :** Knowledge Management Model Developed by Earl (1994, 1998)

The knowledge management model derived consists of four main components:

- Information technology (e.g. Networks and Knowledge Systems) which plays an important role in knowledge capture, knowledge building, and knowledge



dissemination (Earl, 1994; 1998, p.45).

- Knowledge workers who are the core of the organisation and who need skills and development. According to Earl: "*The users (of the technology) become knowledge workers*". After development and training, knowledge workers become core personnel through their knowledge and IT-mediated work. However, their skills need to be continuously enhanced and a more "meritocratic structure rebuilt"<sup>2</sup>.
- Learning organisations are defined by Hills as "*those organisations that encourage learning, creativity, and innovation, and empower their people to solve problems*" (Hills, 1997, p.68). Learning organisations can benefit from the opportunity provided by the Intranet and can be used to promote collaboration and training. The need for an ethos which provided by adopted corporate and external influences is required to lead, reward and support exploitation of knowledge (Earl, 1994; 1998). This is the role of top management or the leaders of the organisations. This factor, along with others which might influence the use of the Intranet in knowledge management, is discussed in chapter three.

**2.5.3** Scott (1998) developed the model shown in Figure 2.3, which investigates the use of the Intranet in knowledge management. Scott (1998) states that the Intranet presents a great potential for knowledge management by facilitating the accessibility of corporate information from any system regardless of computer type or the operating system. This is due to the "*cross-platform open-standards capabilities of the Intranet, which allows data access from multiple sources, including legacy databases*" (Scott, 1998, p.14). The ability to make critical knowledge available wherever and whenever it is needed is a very important concept in knowledge management. Scott concluded that the Intranet is a solution to systems integration, knowledge management and teamwork if used properly. One major criticism of this model is that it is totally based on secondary data collected from Web Sites provided by vendors such Microsoft, Sun, and Netscape. The data collected represents the vendors of the Intranet technologies. The model has not been tested by case studies or survey questionnaires. Scott (1998) recognised that the

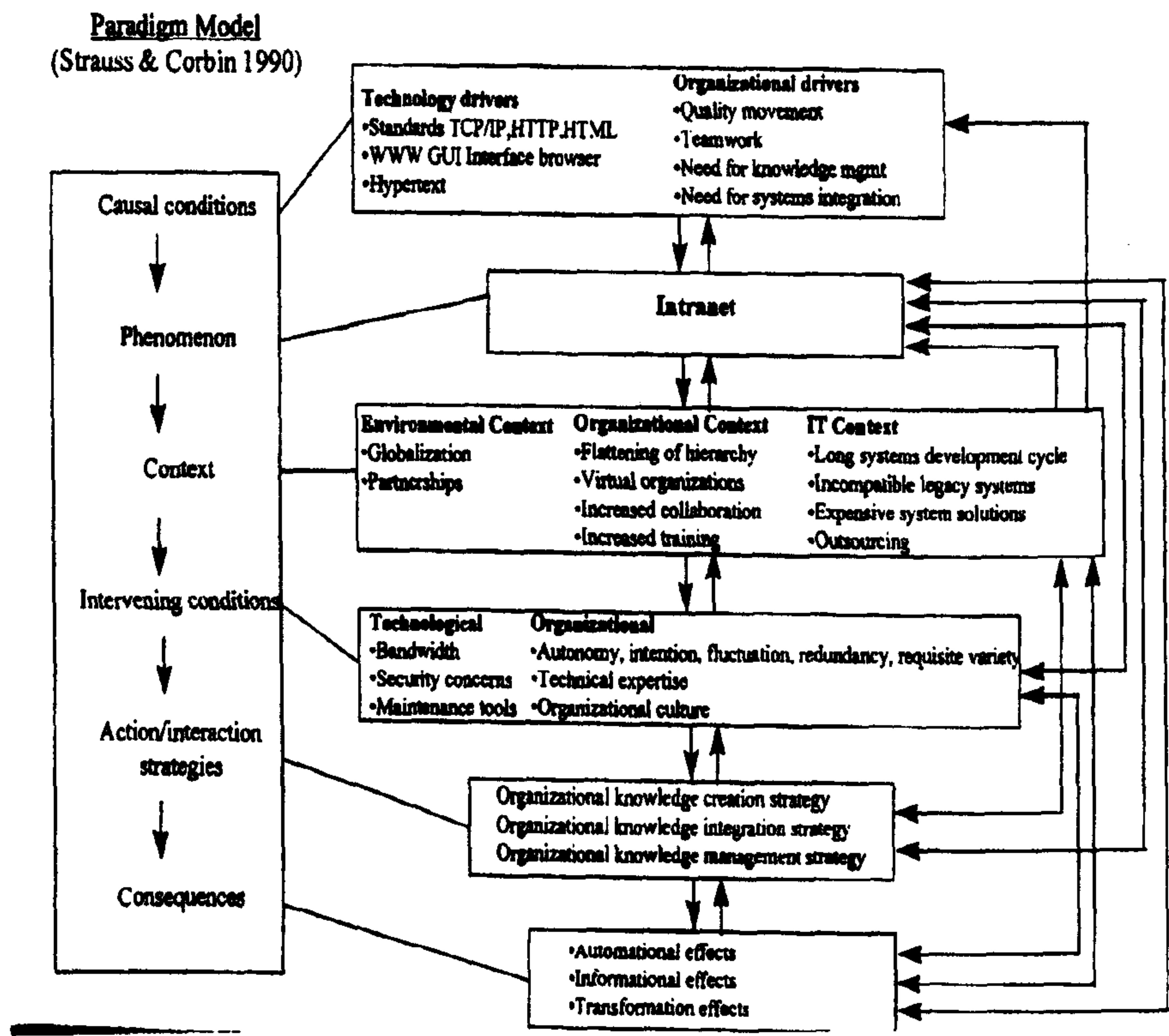
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<sup>2</sup> Means a mechanism which allows knowledge workers to move upward in the organisational hierarchy according to their competence and contribution to the organisational knowledge.



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collected data can be biased. In Scott's (1998, p.4) words *"the articles could be biased but the veracity is likely given the multiple sources and the ease of refutation"*.



**Figure 2.3:** The Intranet and Organisational Knowledge Model Developed by Scott (1998)



### 2.6 Discussion

Nonaka (1994) introduced a theory (see sections 2.3 to 2.4.4) based on the experience of Japanese business and culture. The theory mainly concentrates on the social interaction to generate and transfer organisational knowledge. The main theme of the theory is that organisational knowledge is created through a continuous dialogue between implicit and articulated knowledge. Knowledge generation is one of the most human characteristics, and can be achieved through an identification of the synergistic relationship between tacit and explicit knowledge within organisations. The core concept of the theory is the notion that there is a distinction between tacit knowledge, which is personal and hard to articulate and communicate, and explicit knowledge which can be acquired from different systematic sources. The use of information technology and information systems have nothing to do with knowledge creation and transfer, especially tacit knowledge, which is the emphasis of the Japanese business environment and culture (see Nonaka, 1994). Indeed, the fundamental assumption of some of the previous researches has been that IT has no role in knowledge generation or transfer. Scholars and researchers like Grant (1991); Grant (1996); Nonaka and Takeuchi (1995); Spender and Grant, (1996) concentrate on tacit knowledge which can explain that IT has no role in knowledge generation and/ or exchange. However, other scholars and researchers like Davenport and Prusak (1998); Earl (1994); Earl (1998); Harvey et al (1998); Nonaka et al (1998); Olin et al (1999); Scott (1998); Telleen (1998) observed that with modern IT and IS such as the Intranet, this argument is quite invalid. According to Scott (1998, p.13) "*whereas traditional sequential text-based IT supports explicit knowledge transfer, the multimedia, hypertext capabilities of the Intranet also facilitate tacit knowledge transfer and externalisation of tacit knowledge to explicit knowledge*".

Furthermore, Nonaka et al (1998, p.680) in a case study of the Seven-Eleven Japan corporation have recognised the role of IT and acknowledged the fact that modern IT supports knowledge generation and conversion. In their words "*virtual reality, for example, can support socialisation, and just-in-time training via networks... IT increasingly offers the opportunity to provide knowledge-rich training facilities that help to internalise explicit knowledge. For example, pilots learn how to fly in a virtual*



*space before flying in reality through simulation”.*

This shift in position of the IT role in knowledge management may be attributed to one or more of the following reasons:

- Changes in technology, which seems more likely and was clearly demonstrated in their recent article (see Nonaka et al (1998).
- Western culture, (Nonaka worked during this period in the USA), which depends to a great extent on technology in knowledge generation and management.

The capability of the Intranet as an effective technology for collecting, organising, refining, and disseminating information and the capability of removing time and distance barriers in a cost-effective manner can not be ignored. The Intranet enables the use of hyperlinks to bring together ideas from extremely diverse sources and combines them in such a way that new ideas are able to emerge.

The debate surrounding the use of IT systems in managing organisational knowledge can be summarised in three different themes:

- IT can support knowledge management only in combination mode. This view concentrates on tacit knowledge (Grant, 1991; Grant, 1996; Nonaka and Takeuchi, 1995; Spender and Grant, 1996).
- Modern IT has a greater role in combination and internalisation modes (Nonaka et al., 1998; Malhotra, 1997)
- Modern IT, such as the Intranet, can support not only managing explicit knowledge but also extending its role to support tacit knowledge management and consequently support for all modes (Davenport and Prusak, 1998; Harvey et al, 1998; Olin et al, 1999; Scott, 1998; Telleen, 1998).

The theory (section 2.3 to 2.4.4) and models (Figures 2.1, 2.2, 2.3) are mainly based on Western organisations' experiences with the use of technology in knowledge management. The exceptions are Nonaka (1991; 1994) and Nonaka et al., (1998) which concentrate on Japanese business experiences and culture. The major limitation of Nonaka's theory is that it does not inform organisations how to implement the five enabling conditions (see section 2.3) and the four conversion modes (see section 2.4) using information technology. Furthermore, previous literature does not identify the



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influencing factors that can help organisations reach a high level of usage and consequently utilise the technology to its full potential. This research seeks to establish a balanced and a comprehensive model that links technical factors with other factors human and organisational for implementing the Intranet in knowledge management.

This research is not advocating the adoption of the approaches developed to suit the developed countries without close consideration of their applicability to the environment of developing countries.

This careful approach ensures that developing countries, such as Oman, benefit from work developed in the more advanced economies, which can be modified to suit the cultural differences.

The common theme is that the models call for a balanced approach between technology and other factors (human and organisational) in implementing a knowledge management strategy.

### **2.7 The Impact of the Intranet**

The impact of the Intranet on organisational knowledge has been reported by many researchers and practitioners (Bernard, 1998; Callaghan; Harvey et al.; 1998; Hills, 1998; Kim, 1998; Scott; 1998; Tang et al., 1998; Telleen; 1996). The following aspects are identified as critical when using the Intranet in a knowledge management strategy and therefore, are likely to be of benefit to Omani companies.

#### **2.7.1 Cross- Platform Compatibility (IT integration)**

Tang et al (1998) identified three advantages of using Internet based technology:

- Ease of pulling information from legacy information systems;
- Providing information when needed;
- Low cost implementation since most organisations already have an infrastructure with TCP/IP Protocol (Transmission Control Protocol / Internet Protocol).

The Intranet allows cross-platform compatibility therefore, it does not matter where



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knowledge resides. Tools such as browsers<sup>3</sup> enable users to access and share information and knowledge from and between different platforms that have stored information and knowledge (Bernard; 1998; Kim, 1998; Scott, 1998; Went; 1998).

According to (Harvey et al., 1998, p.349) *"unlike other available IT infrastructures, the Intranet has defined key standards to ensure open communication and interoperability. This interoperability allows communication between dissimilar hardware, software, and networks, which facilitates information sharing across different functional areas, divisions, and organisations. The Intranet's open, non-proprietary architecture makes it flexible, easy to use with other applications, relatively inexpensive to install and maintain"*

The Intranet therefore enables cross-platform compatibility. Thus organisations have the flexibility not to abandon existing legacy database systems due to incompatibility problems (Scott, 1998). According to (Satzger, 1997) integrating different legacy systems can be very expensive and time consuming. The Intranet allows the integration without large penalties in term of cost and time (Kim, 1998; Scott, 1998; Tang et al; 1998).

Furthermore, Internet based technology which is based on open standards, enables organisations to have a flexible policy toward purchase from vendors that meet specific business needs without too much concern about compatibility (Kim, 1998).

### 2.7.2 Information Publishing, Access and Retrieval

According to Davenport and Prusak (1998, p.131). *"The Internet based technology is ideal for publishing information across multiple types of computer platforms, for multimedia databases, and for displaying knowledge that is linked to other knowledge through hypertext links"*.

The Intranet has been used by many commercial companies to publish and access various reports and documents. These include company policy documents, internal report on human resources, company directories, financial data, engineering and manufacturing

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<sup>3</sup> Browser is computer software and it is function to request pages (documents) from the Web server and display these returned documents.



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data, mission statements, organisational standards, catalogues, price books, newsletters, training materials and white papers (Davenport and Prusak, 1998; Harvey et al., 1998; Callaghan, 1998; Scott, 1998; Telleen, 1996). These reports and documents can be published faster and easier via the Intranet (Harvey et al., 1998; Callaghan, 1998; Telleen, 1996; Scott, 1998). Additionally these reports and documents are not limited to text, and, rich media such as graphics, animation, audio and video can be used (Davenport and Prusak, 1998; Scott, 1998). Furthermore, according to Davenport and Prusak, (1998, p.133) *"knowledge in particular domain is often related to other knowledge, and the hypertext structure of the Web makes it very easy to move from one piece of knowledge to another"*

The benefits to the company of adopting the Intranet approach are:

- Cost reduction on printing and distribution (Callaghan, 1998; Harvey et al., 1998; Scott, 1998; Telleen, 1996). For instance Sun Microsystems has saved \$ 25 million a year on document distribution and cut transaction costs on automated cheque processing from \$35 to \$2 per cheque issued by using the Intranet (Scott, 1998). Stancich (2000, p.252) asserted that *"clear advantages of intranets are the reduction in duplication, reduction in paper/video/audio coping and distribution costs and faster, more direct access to information"*.
- Providing the company with the flexibility to update information whenever change occurs in contrast to manual systems, which are calendar driven due to costs.
- Enabling employees to save time by reducing the time taken in chasing information from different sources (eg. documents, databases, disks etc) and verifying its accuracy. Publishing the information on a central system, the Intranet, makes it easy and fast to update the information in contrast to the use of different forms, reports, and documents. This time can therefore be allocated to other tasks in the organisation consequently increasing efficiency and productivity (Drew, 1999; Hills, 1998; Scott, 1998; Telleen, 1996).
- Allowing the employees of the company to access updated information from systems more easily, consequently faster decision can be made based on reliable updated information (Callaghan, 1998, Hills, 1998). Without easy accessing to reliable and updated information bad decisions can be made, or unnecessary costs incurred.



Alternatively no decision may be made which may represent an opportunity being lost (Hills, 1998).

- The Intranet provides an opportunity to empower users, the owners of information to publish, access, update and take control of their information according to Harvey et al. (1998); Hills (1998); Scott (1998); Telleen (1996). This does not mean that the IT specialists do not have a role, rather that their role will be to concentrate on providing infrastructure and services and tackling security issues

### **2.7.3 Training**

According to Bosivert (2000) companies are using IT-based training in general and Intranet based training in particular for several reasons. These include:

- To customise learning environments to meet the changing needs of learners;
- To improve the management of the training;
- To reduce the costs of training.

The idea of on-line training, at least from the theoretical perspective, is that it (online training) can be delivered with minimal human support. That is just provide the learning materials and allow trainees to self train. Intranet based training is the process by which some or all aspects of a training programme may be delivered to the employees throughout the organisation. The important characteristics of Intranet based training is that it is easily duplicable, distributable and updatable at anytime (Boisvert, 2000).

Intranet based training not only delivers learning materials to learners, but can be extended to track everything from learning responses, to exams, and how many times a learner goes back to the same module (Boisvert, 2000).

Whilst training is essential for the workforce in modern organizations, it requires other factors, for example management support and training, to transform employees from traditional learning methods such as the face to face training model to on-line training. There is a cultural issue and some cultures are predisposed to on line training while others are not. In general it is the more bureaucratic practitioners who operate by fixed rules, activities and information flows that do not readily adapt. Another influencing factor is the lack of qualified technical staff within the Omani organisations who are able and capable of putting valuable training material in easily accessible forms for users. As



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stated by Mansell-Lewis (1997), the Intranet is only as good as the contents. Transformation from non-supportive to supportive cultures, requires additional factors such as management support, training and user participation to be considered and incorporated in the introduction and use of information technology.

### 2.7.4 Collaboration

Collaboration between individuals and teams of employees is seen as an essential element in modern organisations. The Intranet presents a potential vehicle for enhancing collaboration between team members, departments and experts within or outside the organisation. Scott (1998) has reported many examples of using the Intranet for such activity, one of these the use of a virtual laboratory at Olivetti to link their main sites and labs world-wide. “ *The goal is to use the Intranet for knowledge management - so researchers access the largest amount of current information, both inside and outside the Olivetti Group, recognising that in an R&D environment, the free exchange of ideas and information is a powerful catalyst for innovation* “ (Scott, 1998, p.10-11).

Inkpen (1998) postulates that collaboration is very important for organisational knowledge growth, where individual's knowledge can be connected with others' knowledge through the technology so new ideas can be discussed, debated, and even discarded if necessary. In this way new knowledge can be born which has a higher possibility of survival and thereby of being integrated into the organisation's knowledge base.

In summary the Intranet can support formal (appointed by the company) or informal (not appointed) groups with particular interests to discuss and focus on a single issue or a set of issues to generate new ideas for solving existing problems. However, according to Al-Harthy (1998), due to cultural factors some Omani companies still prefer physical face to face meetings rather than the technologies of videoconferencing and other Intranet facilities specially when undertaking joint projects. Furthermore, Lai and Mahapatra (1998, p.254) reached the same conclusion when investigating the Hong Kong Companies. In their own words "*it is surprisingly to find that users do not use intranets to modify their collaboration and communication processes, even {when} this technology is considered to be useful and efficient*". They attribute this to the lack of



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understanding of the potential of Intranet technology, lack of training and inadequate diffusion and promotion of the Intranet amongst IT professional and users.

### **2.7.4 Improving Communication**

Modern organisations are increasingly dependent on IT as a vital part of the successful operation and management of any company (Kane, 1999). Organisations communicate information between staff members to reduce uncertainty when making accurate decisions (Daft and Lengel, 1986). The exchange of clear, accurate and timely information is directly related to the business success (O'Brien, 1997). The role of social networks has been recognised as the main source for knowledge and information flow. However, the development of modern technology and communication systems, including the Internet and corporate Intranets, has demanded greater attention to the role of technological networks in facilitating knowledge flows (Swan et al, 1999; Scarbrough, 1999). Nonaka et al (1998, p.680) observed that *"increasingly, IT has come to improve the capabilities to communicate"*.

Many researchers, for example (Drew, 1999; Hills, 1998; Scott, 1998; Telleen, 1996) state that the Intranet improves communication.

According to Hills (1998) the Intranet has characteristics which, improves communication. These are:

- **Speed.** The Intranet allows instant, distribution of information and knowledge in comparison to paper based systems;
- **Consistency.** Managers and leaders can communicate directly to employees rather than going through layers of management thus avoiding message distortion with each subsequent delivery;
- **Free flow of information.** Intranets may support the flow of conversations with other people, who are not normally work in contact. This helps to break down barriers within the organisation;
- **Cross – organisation.** The Intranet facilitates communication and sharing between and among departments. It helps to break down the barriers between different parts of an organisation;
- **Universality.** It enables simultaneous communications to everyone;



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- Availability. It makes communications available when needed.

It has been suggested that the emerging real-time, universal reach, information environment with technology such as the Intranet can help fulfil the promise of knowledge management.

### 2.8 Discussion

The literature review has suggested that many business benefits accrue from the adoption of the Intranet, especially in the area of knowledge management. Many researchers suggest that the use of the Intranet in knowledge management activities (Drew, 1999; Kim, 1998; Scott, 1998) is a positive factor. However, the theory and models discussed show that knowledge management is a very complex issue and technology implementation per se is not enough. Swan et al. (1999) argued for combining IT networks with social networking, which encourages the sharing of knowledge among communities in the implementation of IT in knowledge management. *"IT-based tools and systems create the structural networks but... do not necessarily encourage the social networking processes so necessary for communication and sense making. We therefore suggest that this IT emphasis needs to be balanced by an approach which takes greater account of localised communities of practice and the importance of social networking in KM"* (Swan et al., 1999. pp, 264). However, Davenport and Prusak, (1998) assert that the presence of the technology is enough. In their words *"The presence of knowledge management technologies may even have a positive effect on the knowledge culture of the organisation. Workers who see their company investing time and money on its Web site for example, may gain added incentive to take knowledge management seriously"* (Davenport and Prusak, 1998, p.143).

This research argues that the presence of the technology is not enough, therefore, to elicit best practice this research intends to include factors such as management support, culture, training and user participation when considering the implementation of the Intranet in knowledge management. As according to Harvey et al., (1998) knowledge sharing across an organisation is more a cultural than a technical issue.

Scott (1998) reported great resistance to Internet based technology in Asia in comparison the US or Europe due to cultural differences. Furthermore, Internet based



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technology is viewed as an American conspiracy in the developing countries. The openness of Internet based technologies may raise the fear of losing resources, uncovering secrecy and causing embarrassment in a culture, especially where business dealing is shrouded in secrecy (the culture of most Omani businesses).

The Intranet presents a great potential for developing countries' organisations managing their knowledge, however, developing countries need to hire, develop and train technical and non technical staff and promote organisational culture if they are to benefit from the opportunity and the potential presented by the Intranet.

### **2.9 Summary**

Some knowledge management concepts have been introduced to strengthen the understanding of the issues that need to be considered in implementing the Intranet.

Recent studies support the use of information technology in general and the Intranet in particular in knowledge management activities (Davenport and Prusak, 1998; Drew, 1999; Harvey et al, 1998; Kim, 1998; Nonaka et al., 1998; Olin et al, 1999; Scott, 1998; Telleen, 1998). The theory and models discussed show that knowledge management is a very complex issue and technology alone will help but it is not, of itself, enough. This research is arguing for the inclusion of factors such as management support, culture, training and user participation in considering the implementation of the Intranet in knowledge management.

It is commonly accepted that consideration of factors such management support, training, user participation and organisational culture are necessary in the implementation and use of the Intranet in knowledge management. These factors are discussed in chapter three.



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### **Factors Influencing the Use of the Intranet in Knowledge Management**

#### **3.1 Introduction**

Chapter two has investigated knowledge management concepts and knowledge management models in organisations which have used IT systems to manage knowledge. However, previous literature did not say much about the factors that influence the use of the Intranet in knowledge management which are very important to researchers and practitioners yet it has received little research attention. The aim of this chapter is to identify factors that influence the use of the Intranet within the context of Omani organisations and consequently fill the knowledge gap that is existing in this area. Two methods were used to identify the factors:

- Literature review;
- The researcher felt that a literature review was not enough to identify the factors, therefore, expert opinion was sought to reach a final list of factors that are suitable to Omani organisations.

#### **3.2 Background**

Information Technology (IT) and Information Systems (IS) have been increasingly used in a social organisational context, their success or failure seldom being explained by technical factors alone (Benynon-Davies, 1995; McBride, 1997; Poulmenakou and Holmes, 1996). Today organisations are looking towards the Intranet as a management resource. Previous researchers concentrate on the use of the Intranet in managing organisational knowledge and the benefits to the organisation from the adoption of the Intranet (e.g. Bernard, 1998; Kim, 1998; Gonzalez, 1998; Scott, 1998). However, most of these researchers are silent about the factors that make one organisation successful with the Intranet while others



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struggle. Therefore, these factors should be identified and examined in order for Omani companies to better utilise the Intranet in managing organisational knowledge.

### **3.3 Previous Research**

The Intranet is predominantly used in a social organisational context, therefore, its success or failure is dependent on the dynamic environment of the organisation within which it exists. Consequently an Information Technology (IT) system that is successful in one company may be unsuccessful in another organisation. According to Benynon-Davies (1995); McBride (1997); Poulmenakou and Holmes (1996) this cannot be explained by technical factors alone. Abdul-Gader (1992) and Al-Abdul-Gader and Alangari (1994) attributed the failure (or little utilisation) of IT systems in the developing countries to the following factors:

- Lack or little top management support for IT;
- Inadequate IT training;
- Lack or little user participation in IT applications' development.

Al-Abdul-Gader and Alangari's findings suggest that the presence of these factors may help organisations in the developing countries towards better utilisation and higher level usage of IT systems. The factors identified by Al-Abdul-Gader and Alangari cover different participants (Top management, User and IT Staff) in the organisation and which IT systems depend on them to be used successfully and consequently benefit the organisation. The successful use of the Intranet in knowledge management cannot be achieved without understanding the role of different participants and integrating them in the development process. The knowledge of the factors that make some organisations successful with the use of IT while others are not, is very important for the Omani companies who want to improve the use of technology and reach higher levels of Intranet usage.



### **3.4 Intranet Usage Levels**

Once organisations have adopted the Intranet, the level at which the information system is used must be assessed and evaluated in order to determine the benefits, the costs and most importantly, the factors which make one organisation's use of the Intranet low, while another's is high. The Gartner Group (1996) has classified Intranet usage into three different levels based on the complexity of each level:

#### **3.4.1 Company Simple Internal Web (Low Use)**

This is the simplest form of the Intranet usage. It is basically a one-way information flow system and it is used mostly for publishing static information. People can access the information when needed and can use a search engine to access particular information (Gonzalez, 1998). This can be characterised as low level use of the Intranet according to the Gartner Group and is the easiest level of the Intranet to deploy since it requires very little technical knowledge to implement.

#### **3.4.2 Interactive Collaboration (Medium Use)**

Two-way interactive level of information flow regardless of location, time and hardware and software platforms. The interactive level extends the simple publishing model by adding discussion features and newsgroups. This level can include workflow, document management and can also be used for collaboration on projects and group work. This level can be described as medium use of the Intranet by the Gartner Group.

#### **3.4.3 Interface for all Applications (High Use)**

This is the highest level of Intranet usage where companies can use the Intranet to provide standardised access to various applications, group discussions, databases and other legacy systems. Existing legacy systems and data warehouses can be accessed seamlessly via a Web browser, regardless of time and location, providing a single common user interface. According to Field, (1997) this level of Intranet usage can provide management with an electronic tracking system of employees' training results, a process that would be more



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difficult to monitor in a non computer-based training system. This level is characterised as the hardest since its implementation requires a very good standard of technical knowledge.

### **3.5 Factors Influencing the Use of the Intranet**

The Intranet is an extension of Internet applications and technologies and since the Internet is a part of an information system (IS), the attempt is to identify the factors that influence the use of IS in general and the Intranet in particular in knowledge management. Michael (1996) pointed out several success factors to which the organisations need to pay great attention when implementing a corporate Intranet. These include top management support, training, and security.

Furthermore, Holsapple and Joshi (2000) identified three major factors that conspire to influence knowledge management in an organisation:

- Managerial influence;
- Resource influence;
- Environmental influence;

Figure 3.1 shows a proposed factor model, which may influence the use of the Intranet in knowledge management. The model is based on previous literature that examined factors influencing the use and the success of information technology within the organisational context. In particular the model is based on the Powell and Dent-Micallef (1997) resource-based theoretical framework, which shed some light on why some companies struggle while others flourish with the same IT. Their framework draws out some important factors which complement IT and must be considered. Their model is based on integrating IT with other factors such as top management commitment and support, training and organisational culture among others.

Furthermore, Al-Gharbi et al (2000) have found a linkage between top management support, training and user participation and the use and success of the Intranet within Omani companies. Additionally they assert that 89% of the variation in the use of the Intranet (Low, Medium and High) within the Omani organisations are mainly attributed to top management support, IT staff training and user participation.



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Other factors identified by researchers are organisation size, employee rotation and different data formats (Davenport and Prusak, 1998; Tang, 2000). However, before proceeding to discuss these factors in detail, ten experts working in Omani companies, that have adopted the Intranet and have rich experience of using the Intranet were interviewed to determine whether the identified factors are applicable to the Omani companies. The meaning of each factor was explained before the participants were interviewed. The purpose was to make sure that the participants understood the meaning of each factor in the context of the research objectives. In addition measures were taken to validate or otherwise the applicability of each factor from previous research. Using a three-point scale developed by Tang (2000), ranging from 3 to 1, where 3=very important; 2= important; 1=not important, Table 3.1 shows the results of the experts' opinion regarding the listed factors:

Factor	Very important	Important	Not important	Average =21.11
Management support	6	4	0	26
User Training	4	4	2	22
IT Staff Training	7	3	0	27
User participation	3	7	0	23
Availability of funding	4	5	1	23
IT structure	4	4	2	22
Organisation Size	0	2	8	12
History of IT use	1	3	7	16
Intranet security	3	6	1	22
Employee rotation	1	2	7	14
Nature of Business	1	3	7	16

**Table 3.1: Shows the Experts Opinion of each Factor**



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Previous researchers identified two or three factors at most that influenced the use of information technology. This research initially identified eleven factors (see Table 3.1). However, after the first validation only seven of the eleven factors rated by experts to have major influence on the use of the Intranet within the Omani companies (see Figure 3.1) remained. Exclusion on the basis that factors with an average of less than 21 were dropped from consideration. This benchmark has been used by other IS researchers as the basis on which to accept or reject a factor. For example Tang (2000) used the same procedure to reject factors albeit he used the average score as the exclusion benchmark. Furthermore, Eder (1998) and Scott (1998) state several reasons for the importance of top management. The remaining factors are now discussed in more detail.

Influencing Factors

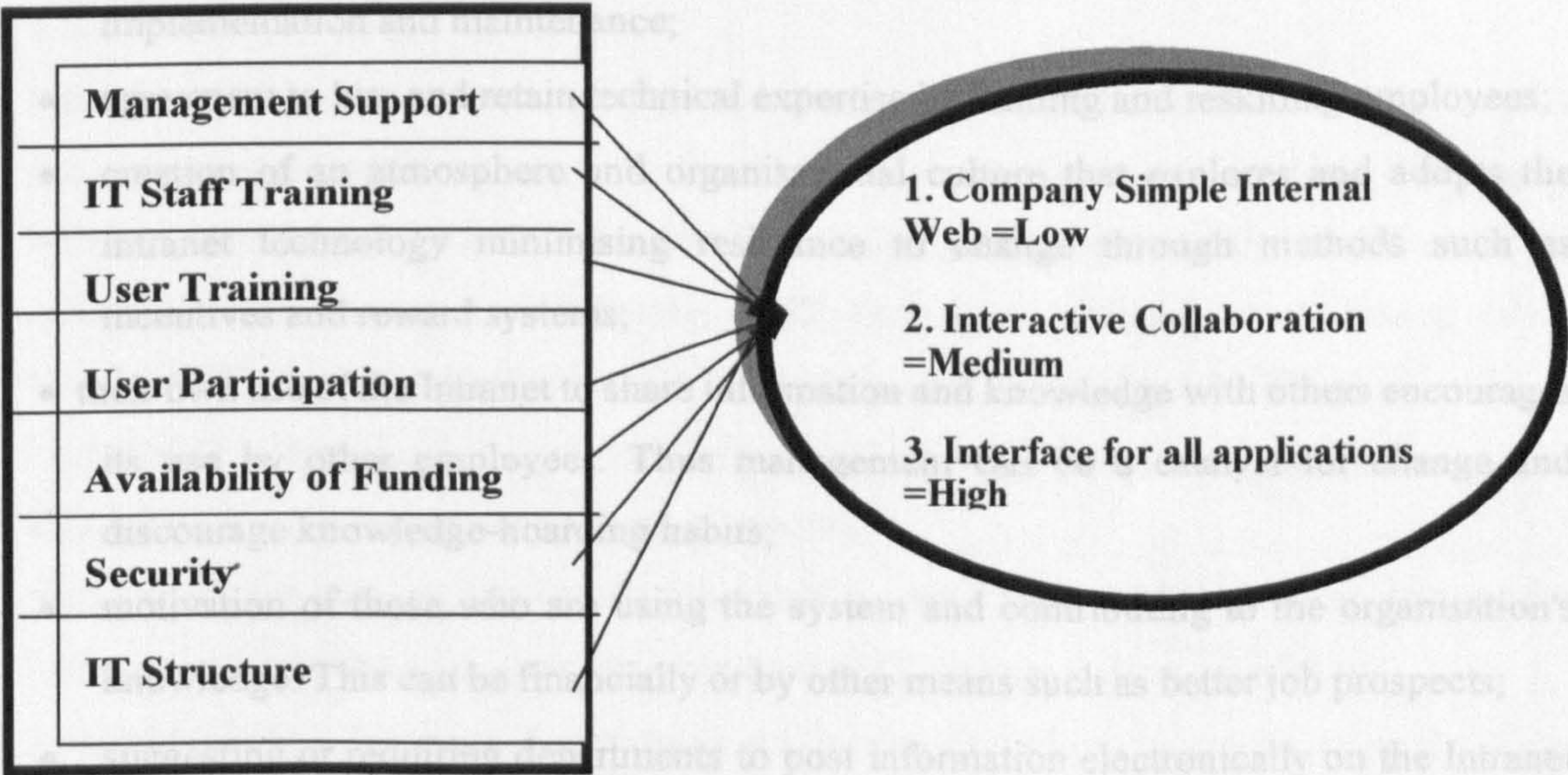


Figure 3.1: The factors Model



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### **3.5.1 Top Management Support**

Literature review suggests a linkage between top management support and the success of IT systems. According to (Ernst & Young, 1998) top management support is most essential for the successful use of IT for in a knowledge management programme. Similarly, Igbaria et al (1997) and Powell and Dent-Micallef (1997) have found a positive relationship between management support and the successful use of Information Technology. Additionally Eder (1998) asserts that there is a significant correlation between top management support and the diffusion and the infusion of the Intranet. Furthermore, Eder (1998) and Scott (1998) state several reasons for the importance of top management support the use of the Intranet in a knowledge programme:

- support for fund allocation to buy the necessary tools required for the Intranet implementation and maintenance;
- agreement to hire and retain technical expertise by training and reskilling employees;
- creation of an atmosphere and organisational culture that explores and adopts the Intranet technology minimising resistance to change through methods such as incentives and reward systems;
- their own use of the Intranet to share information and knowledge with others encourages its use by other employees. Thus management can be a catalyst for change and discourage knowledge-hoarding habits;
- motivation of those who are using the system and contributing to the organisation's knowledge. This can be financially or by other means such as better job prospects;
- suggesting or requiring departments to post information electronically on the Intranet rather than print it on paper;
- suggesting or requiring employees to communicate and collaborate through the Intranet when they cannot be together to work on a project.



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- suggesting or requiring the organisation uses the Intranet as "front-end" interactive applications in order to provide a single-user interface for users regardless of hardware and software platform and their location in the organisation.

Top management support for Intranet usage within Omani organisations can be operationalised by the communication of the top management to employees to use it for the benefit of the organisation and by providing the resources that are needed for this purpose. Furthermore, by communicating the benefits of using the Intranet as an interface for all applications. Therefore, it is hypothesised that:

**H1: There is a positive relationship between Top Management Support, and the Level of Intranet Usage.**

### **3.5.2 User Training**

Many researchers and practitioners see user training as an important factor influencing the use and success of IT systems. In the IS literature, a significant positive association between system use and success and user training is reported (Al-Abdul-Gader and Alangari, 1994; Davenport and Prusak, 1998; Earl, 1994; 1996; Ernst & Young, 1998; Igbaria, 1997; Kirlidog, 1996; Meehan, 1994; Remenyi, 1996; Scott, 1998).

Earl (1998) further argues that if knowledge is to be used as a basis for strategy, then users' training on how to use the technology is essential.

Without proper training employees are likely to experience problems using the system leading to low the usage or even abandonment of IT systems (Igbaria et al, 1997).

It should be clear, however, that training is not only about how to use the technology but also to educate the users and broaden their understanding about how the technology adds value and improves their work. to explore the value of the system. This kind of training may lead to time savings and minimise user resistance. Hence it is hypothesised that:

**H2: There is a positive relationship between User Training and the Level of Intranet Usage.**



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### **3.5.3 IT Staff Training**

In addition to users' training, employees providing IT, IS services need training too. This enables them to tackle the different issues such as security, standardisation and development of advanced features for the users. This is a theme echoed by many researchers, for example Scott (1998, p.14) states that "many IS developers need reskilling, training, motivation and time to gain web systems development skills". Similarly Jayasuriya (1993) and Kirlidog (1996)) reported that one of the major problem facing developing countries is the lack of qualified IS personnel and they attributed this to the inadequacy of the training. Al-Gharbi et al (2000) found a positive relationship between the level of Intranet usage (Low, Medium and High) and the level of training provided to IT staff within Omani companies.

Scott (1998) argues that training is essential for IT staff to:

- Keep them aligned with the changing needs of business;
- Learn new technical skills to cope with maintenance problems;
- Manage the huge volume of information within a large number of disorganised electronic documents posted by different parts of an organisation;
- Manage and maintain decaying links;
- Provide technical assistance so that employees can take advantage of advanced features such as interactive forms and scripting that can be integrated with other applications;
- Manage information flow;
- Speed up the Intranet development and channel it in the direction in accord with most the company goals and the objectives.

Tang (2000, p.158-159) asserts that "...The Intranet's technologies and management are rather complicated aspects to cope with, such ... security, change of application platforms, change of arithmetic operations, employee's authorisation management, the integration of work flow, and information updating. To sum up, all of these problems in the process of adoption, including planning, establishment, management, and maintenance, need a great



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deal of information and a large amount of experts who are experienced in Intranet adoption".

Furthermore, (Remanyi, 1996) states that assumption that IT staff who have competence in one technology have the same competence with other technologies without adequate training is a crucial mistake. In particular IT staff need training to gain technical skill (due to the fact that Internet technologies are new, especially in the developing countries), this might include knowledge of programming languages, operating systems, and communication protocols. Without these skills, the IT professionals cannot provide the services to the users which are required if a higher level of Intranet usage is to be reached. Therefore, it is expected that:

**H3: There is a positive relationship between IT Staff Training and Level of Intranet Usage.**

### **3.5.4 User Participation**

User participation refers to a set of behaviours, attitudes, and assignments in which users may be engaged throughout the systems development (Barki and Hartwick, 1994). Researchers have reported a linkage between user participation and the use of IT systems. According to Lockett (1998) success of IT systems depends on bridging the gap between business professionals who in most cases know little about information systems and IT professionals, who often lack or know little of detailed business needs.

Gonzalez (1998) asserted that users' involvement in system development increase their satisfaction. To avoid implementing an Intranet for knowledge management that no one will use, it is essential to involve the users in the design, development and implementation the technology. Involving employees with the introduction of a new system can be beneficial because it reduces uncertainty (Poulymenakou and Holmes, 1996).

The following are the main reasons for the employees' participation in the development of the Intranet:



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- Reduce uncertainty and minimise confusion about the expectation from a given Intranet development activity (Gonzalez, 1998; Poulymenakou and Holmes, 1996);
- User participation is an opportunity for an ongoing feedback loop to provide information for the IT professionals which can be used immediately or at sometime in the future. Proactive dialogues facilitate the conditions for the acceptance of new technologies (Gonzalez, 1998).

In order to motivate users and to obtain their full co-operation and support they should be involved from the beginning of the project. Hence, it is expected that:

**H4: There is a positive relationship between User Participation in the Development of the Intranet Applications and Level of Intranet Usage.**

#### **3.5.5 Availability of funds**

Availability of funds for modification, enhancement and upgrading of the system and also for the training of the technical staff as well as other users, is crucial for the success of implanting, using and maintaining the Intranet for knowledge management. The lack of funding can result in delays in routine maintenance, as well as delays in enhancements to established systems and to the development of new systems. In some organisations inadequate funding results in insufficient help facilities, resulting in a high rate of user error (Remenyi, 1996). Furthermore, Kirlidog (1996) has reported that lack of funding is a major problem in developing and maintaining effective information systems in the less developed countries. Therefore, it is hypothesised that:

**H5: There is a positive relationship between Availability of Funds and Level of the Intranet Usage**



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### 3.5.6 IT-IS Structure

Eder (1998) states that the structuring of the IT, IS function may be either centralised, decentralised or some intermediate state.

- Centralised. Here is the total responsibility for information technology (IT) and information systems (IS) lies within the corporate IT, IS function.
- Decentralised. Here the IT and IS total responsibilities are dispersed throughout the business units of the organisation.
- A hybrid of the above (Here the total responsibilities are dispersed between business units and IT, IS function).

According to Earl et al (1998), centralisation of the IS function is necessary in order to achieve economies of scale, ensure the compatibility of applications and the ability to integrate them, and to optimise the use of scarce resources. However, decentralisation is necessary to allow IT professionals to respond to the real specific departmental needs, to encourage managers to participate in IS, and devolve control of IT resources to the local units.

Traditionally the IS function was centralised due to its evolution in the centrality influence of the mainframe environment. However, with *“distributing computing, combined with networking, client-server architecture, and the like are not only putting more power and application capability into the hand of users, they are increasingly the technological experience and knowledge of the users”* (Earl et al., 1998, p.227).

It was reported that users in some organisations are developing some of their applications, due to the rapid improvement of user capability, and the availability of simplified application development tools (Couger, 1998).

It is reasonable to suggest that end-user should participate in the development of the Intranet applications and have control of information access, retrieval, publication and update because they are the users of the information. Consequently Intranet applications can be tailored to meet the user's specific departmental needs, whereas the IS/ IT function is still responsible for developing the technology architecture, protocols, standards and



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security. It is expected the IT structure has influenced the level usage of Intranet within Omani companies. Hence it is expected that:

**H6: There is a positive relationship between IT Structure and Level of the Intranet Usage**

### **3.5.7 Security of the Intranet**

Security has been seen as a major sticking point in the adoption of Internet technologies within organisations. The primary concern is the outside intruder (e.g. hackers, spies, commercial competitors etc) who may connect to the Internet and try to enter the local network. This fear may lead user to hesitate using the Intranet and hence, it is hypothesised that:

**H7: There is a positive relationship between Perceived Security of the Intranet and the Level of Intranet Usage.**

This factor has been discussed in greater detail in Chapter One.

## **3.6 Summary**

Information Technology and Information Systems are used in a social organisational context, therefore, their success or failure is seldom explained by technical factors alone. The Intranet is no different. Its impact on knowledge management depends on or is influenced to a great extent by, the mentioned factors above. The literature review has suggested some factors influencing the use of the information systems in general and the Intranet in particular. However, the identification of the factors in the literature review was sufficient for this research. Therefore, experts' opinions were sought to validate the literature review.



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The adoption of Intranet represents a change in the way organisations manage their information and knowledge. Thus management support, training and user participation become crucial to minimise resistance and motivate the employees to use the system.

The Intranet has the potential to enable an organisation to manage its information and knowledge better than before. However, this potential is influenced to some extent by the factors discussed above.



## Chapter Four

### The Research Model

#### 4.1 Introduction

The literature review in the previous chapters has laid the foundation for the theoretical framework for this study. The purpose of this chapter is twofold:

- To link previous chapters and to formulate a robust theoretical approach suitable for this research;
- To validate the theoretical model with two mini- case studies and a pilot questionnaire survey.

#### 4.2 Theoretical Debate

Methodologically speaking, the advocates of ‘grounded theory’<sup>1</sup> argue that the literature of theory and fact on the area of study be ignored when commencing field work and the primary concern of the research **should be focused on the discovery of theory directly from field work** (Glaser and Strauss, 1967). The proponents of the grounded theory approach **caution researchers against depending on literature as a basis for a theoretical approach**. In the purest sense intended by those who advocate the grounded approach to theory generation, one should not go into the research with pre-conceived ideas from the literature, for fear of clouding any analytical insights to be drawn from the data collected in the field. According to Remenyi and Williams (1995, p.193) *"the grounded theory emerges through the process of concept discovery, within which the researcher develops abstract concepts and categories from the data"*. The purpose is to avoid contamination of the emergence of theoretical categories, one of the main steps in the theory-generating approach, according to grounded theory.

On the contrary the opponents of grounded theory advocate a completely different and opposite approach. Scholars like Checklend and Howell (1998) and Walsham (1995) argue that, in order for the research to be carried out successfully, a theoretical

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<sup>1</sup> Grounded theory, according to Glaser and Strauss (1967), means a systematic discovery of theory directly from data.



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framework must be known beforehand. Checklend and Howell (1998) considered that any work that does not declare in advance its theoretical framework is not research at all. *"The research might lead to the framework being modified, or, in the extreme case, abandoned, but without a declared -in- advance epistemological framework, it is sometimes difficult to distinguish researching from novel writing"* Checklend and Howell (1998, pp.23). In Checklend and Howell's view, the declaration of a theoretical approach based on literature review distinguishes research from story telling.

This research follows the **Declared and Validated Approach** which means that a theoretical framework must be known beforehand. Nevertheless, validation of the theoretical approach has to be done before full work carried (major part of the work is carried out). The **Declared and Validated Approach** argument is that, the researcher should not go straight into the fieldwork but neither should he totally rely on the literature review without testing the validity and suitability of the theoretical approach prior the commencement of the major part of the work. The strategy of the **Declared and Validated Approach** is to relate theory to practice through fieldwork and hence the applicability of the theory so that complete understanding can occur.

This strategy is also the view of Walsham (1995, p.76) who asserts *"the motivation for the use of theory in the earlier stages of the interpretive case study is to create an initial theoretical framework which takes account of previous knowledge, and which creates a sensible theoretical basis to inform the topics and approach of the early empirical work"*. Therefore, the literature review cannot be avoided at this point if one is to expend one's resources efficiently and focus on research which will contribute to knowledge. Furthermore, the present study surveys the literature early in the investigation in order to focus the research effort more efficiently. Doing so also facilitates more sensible data administration and management. Figure 4.1 shows the process of the **Declared and Validated Approach**.



4.3 Exploratory Study

To facilitate the Declared and Validated Approach, an exploratory study was carried out in Oman between April 7-26, 2006. The study was conducted through structured and semi-structured interviews with four IT professionals from private sector companies. Furthermore, sixteen survey questionnaires were distributed to IT directors and heads of Internet / Intranet applications in various organisations (See also Chapter Five). The purpose of the exploratory study was to validate the proposed theoretical approach and make any necessary adjustments. In order that the main components of the research methodology should be clear, it should be noted that the validation of the proposed approach is reported below (see section 3.5). The results of the exploratory study are reported below.

4.3.1 Mini-Case Study One (Company A)

4.3.1.1 Background and Context

Company A is an insurance company in Oman with more than three hundred employees and many offices in the country. It also has branches in other countries. A Mini-frame with database and Colours was developed to automate processes which had been done manually. The company IT director and all of the IT staff were newly hired expatriates due to a lack of local people with computer skills at that time. The expatriates were foreign to the culture of the company and the IT department was very small. The computer department under the leadership of the IT director was responsible for improving on the computerisation process and some of the IT staff were not trained without providing proper documentation. During this time technology trends moved toward PCs and a network environment, which might have solved the need of the company's problem. He failed, however, to recognise the problem. The users struggled to use the system without proper training. The IT director lost the top management confidence and support, and eventually he lost the top management confidence and support.

Figure 4.1 : The Declared and Validated Approach



### **4.3 Exploratory Study**

To facilitate the **Declared and Validated Approach**, an exploratory study was carried out in Oman between April 1-26, 1999 in the form of unstructured and semi- structured interviews with four IT professionals representing 2 Omani private sector companies. Furthermore, sixteen survey questionnaires were distributed to IT directors and heads of Internet / Intranet applications in eight Omani private sector organisations (See also Chapter Five). The purpose of the exploratory study was to validate the proposed theoretical approach and make any adjustments if needed in order that the main components of the research model be suitable for companies in Oman. It should be noted that the validation of the factors was conducted at an earlier stage of the research (see section 3.5). The exploratory investigation is reported below.

#### **4.3.1 Mini-Case Study One (Company A )**

##### **4.3.1.1 Background and Computer History**

Company A is an insurance company in Oman with more than three hundred employees and many offices in the country. It also has many agents in a number of countries. A Mini-frame with database and Cobol systems was adopted in 1984 to help to automate processes which had been done manually.

The company IT director and all of the IT staff were newly hired expatriates due to a lack of local people with computer skills at that time.

Although the newly hired expatriates had sound technical skills they were foreign to the culture of the company and the business environment of the country. The computer department under the leadership of the first director could not improve on the computerisation process and some of the IT staff left the company without providing proper documentation. During this time technology trends moved toward PCs and a network environment, which might have solved the need of the company's problem. He failed, however, to recognise the problem. The users struggled to use the system without proper training and users documentation. The users lost faith in the system and in him (the IT director ) and eventually he lost the top management confidence and support.



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Another development, which affected the company, was the bankruptcy of the Wang Corporation. This resulted in the closure of their local office on which the company depended for maintenance and support.

Face to face interviews were conducted with one participant in the old system and the new IT director, and they explained and summarised what had gone wrong.

- The users did not use the system because they did not understand the reasons behind its adoption and were not involved in its design and implementation;
- The system was not user friendly;
- No proper training was given;
- The culture prior to the introduction of the system was totally dependent on manual systems, so the introduction of the computer system was a shock to the existing norm;
- There was *“nothing wrong with the technology and, at that time, the systems were considered to be right for the type of work that the company was doing”*, one participant observed;
- No proper documentation was available either for system or for the users.

### **4.3.1.2 New Direction**

The management of the company decided in 1994 to appoint a new director for the IT department and to make sure that he not only possessed the technical skills, but also an understanding and local business environment.

After careful consideration, top management selected one of the local people who had the required technical skills and many years of experience working in the private sector.

### **4.3.1.3 The Work of Committee**

The new experienced director learned from the company's mistakes and proposed the formation of a committee consisting of user departments, IT staff and senior manager to evaluate the need of the computerisation of the company. The committee was established and decided to have a new infrastructure in which each office of the company had a Local Area Network (LAN) connected to other offices in different major cities of the country and the to the main office via a Wide Area Networks (WAN). Unix



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System, Servers, with an Oracle database were adopted. Many integrated Modules were built in-house with user participation to support the company's needs.

### 4.3.1.4 Intranet Adoption

In 1997 the committee felt that there was a need for tool to help the company managed its knowledge and to cut costs. "We do have most of the information, however, it is difficult to locate and share when we urgently need it" one participant commented. The committee set the following objectives:

- Improve communication and knowledge sharing between different offices, agents in different countries and the main offices;
- Cut costs;
- Standardise information publishing.

The committee decided to build its Intranet in three stages:

- To convert the company information that had existed in many forms (PCs, Paper documents, Tapes etc.) to the Intranet;
- To access all applications through the Intranet;
- To use the Intranet for collaboration on projects between different offices and even with other companies or government agencies.

The committee decided to adopt the Intranet for the following features:

*" We have chosen the Intranet because it is easy-to-use technology, not costly in comparison to other technologies and it can support not only text but graphics, video, and audio, so the knowledge can be presented in a rich way",* another participant said.

*" This, or any technology will not work by itself and we are sure of this from our ten years' experience with the old systems. Furthermore, all factors that might motivate the users and IT staff are taken care of. Moreover, the ease of use of this technology minimises user resistance",* one participant commented.

The company, learning from its previous mistakes acted on the committee's decision, to include not only the IT staff but also other participants. *"The users are in the driver's seat in the decision making process because they are the ones who will use the system and our job is to satisfy their needs "*.



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One of the reasons for the Intranet adoption was to replace all paper-based documentation and messaging with e-mail and web-based publishing and communication. However, many employees preferred to use the paper-based methods. Thus the Intranet for the first year was used to duplicate rather than replace a paper-based system. For example, some documents were still printed and distributed to employees for the first year.

Top management has used all means to encourage company employees to use the Intranet for publishing and communication, and required them to be conducted on the Intranet after the first year. The management strategy is to stop or at least to minimise the use of paper after the first year.

*"Our strategy at this point is to encourage every employee to participate and use the Intranet. However, this strategy may change in the future to strike a balance between freedom of publishing and quality of information".*

*"The use of the Intranet has increased substantially after the first year and sixty percent of our employees today totally reliant on the Intranet for publishing and communication. The use of the Intranet facilitates our employees with easy and convenient access to up to date information. This consequently enables them to make quicker and better decisions".* This process gives employees of a company the **Autonomy** (the flexibility of acquiring and accessing information) to respond to the business environment and generate viable ideas.

*"We feel that the Intranet has adequate security. We have Firewalls to block any intruder from entering to our Network. We are open minded and evaluate other security measures we deem necessary to protect our information and knowledge",* the participant observed.

The company has invested heavily in knowledge workers through continuous training.

*"Training is very essential, especially for IT staff",* one participant said.

### 4.3.1.4.1 Result

The first fruits of implementing the Intranet for knowledge management can be summarised in the following points:



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- It has improved communication and knowledge sharing with different offices and the main office. “The *Intranet* has decreased not only the time, but the effort to find information and knowledge and to communicate to people in our organisation”, another participant observed;
- It has reduced costs: printing and distributing various reports etc. Costs fell from approximately £ 100, 000 to £ 20, 000. (80% costs reduction) according to IT director;
- It has placed more power in the hands of the users. “User-departments can publish, retrieve, update and share knowledge with little or no help from IT staff”;
- It has standardised information publishing. “We are using the *Intranet* to publish information and knowledge that previously existed in a range of systems (paper documents, PCs, Tapes, Min-Frame, etc) but which were difficult to access and update”. Access to information via the Intranet allows deliberate redundancy in knowledge, it cuts costs in paper, mailing and distribution (**Redundancy** see 2.3.4).

### 4.3.2 Mini-Case Study Two (Case Company B)

#### 4.3.2.1 Background

Company B is one of the information technology industries in Oman with approximately 200 employees. It uses information technology heavily in its business activities and has a very successful computer history.

#### 4.3.2.2 Intranet Adoption

The company felt there was a need in a system that can help its employees to access different applications easily and to codify reports and documents many of which were scattered over in a number of different systems, making them difficult to share, access and update.

After the approval of top management, the IT department and user department representatives agreed to divide the project into 3 stages. In 1997 the company started to use the Intranet in the following activities:

- Company mission, policies, rules and regulation statements: (**Intention**);

This is basic knowledge that enables an employee to view and approach the world and consequently make sense of the surrounding environment (see section 2.3.1).



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- Organisation charts and Directories :(**Requisite Variety**);

This is another enabling condition for knowledge management where employees can access information that can help them to respond to the challenge provided by the business environment (see section 2.3.5).

- Training materials;
- Product specification;
- Memos and newsletters;
- Personnel manuals;
- Forms;
- Network management;
- Dissemination of lessons learned :( Internalisation, and Combination) ;

This is an important benefit of the Intranet that enables employees from different departments and locations to share knowledge about company success or even failure in order to build on success and avoid future failures (see sections 2.4.1, 2.4.2, 2.4.3, and 2.4.4).

The company has about 80 users of the Intranet on a daily basis. Employees are encouraged to publish and to contribute to their organisation knowledge after obtaining an approval, which usually takes half a day.

According to one participant the company philosophy regarding the usage of the Intranet can be summarised as follows:

*"The idea is not only to gather information but to present it in a way that employees can access and interact with and contribute back so that others can learn from it too"*

*"The employees are using it heavily each day and they find much on the Intranet which is of interest to them and relevant to their work. We are a computer company, our culture is based on automation and our employees are used to the idea of on-line process"*.

The company is using the Intranet to train employees in various software and hardware systems. Simulations and software programmes are used to teach new knowledge to employees through hands on experience. *"The training that is provided on the Intranet is flexible and helps you learn. Employees are therefore using it and they find it very beneficial"*, one participant stated.



The company is now evaluating security issues before taking the decision to integrate all of their applications with the Intranet. *"We have a Smart Wall which keeps a log of any unauthorised user trying to log into to our network. We are evaluating security issues before putting our sensitive information, knowledge and applications on the Intranet. We are not in a hurry. We need time to train our people. Let them use, understand the system, and discover its potential"*

According to the head of Intranet applications *"full management support, proper training of user and IT staff, and user participation in Intranet development are the key factors for the integration of all our applications with the Intranet"*.

### 4.4 The Research Model (The Impact Model)

The Impact Model (see Figure 4.2) is based on models discussed in chapter two (Eral, 1994; 1998; Hansen et al., 1999; Nonaka, 1991; Nonaka, 1994; Nonaka et al., 1998; Scott, 1998). The model is a combination of technological, human and organisational factors which are necessary for using the Intranet for knowledge management.

The Impact Model incorporates the theory of organisational knowledge management, which posits that five conditions (see sections 2.3.1, 2.2.2, 2.3.3, 2.3.4 and 2.3.5 and four conversion modes (see sections 2.4.1, 2.4.2, 2.4.3, and 2.4.4) are necessary to facilitate the transfer of explicit and tacit knowledge from the individual to the group and eventually to organisational levels (Nonaka, 1994; Nonaka et al., 1998; Scott, 1998).

The Model is also based on previous literature that identified and examined factors influencing the use and success of information technology within the organisational context. In particular, the model is based on the Powell and Dent-Micallef (1997) resource-based theoretical framework, which sheds some light on why some companies struggle while others flourish though using the same IT. Powell and Dent-Micallef, framework draws out a number of important factors, which complement IT and must be considered. Their model is based on integrating IT with other factors such as top management commitment and support, training, and organisational culture among others.



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Furthermore, the Impact Model is based on previous literature that identified and examined factors influencing the use and the success of information technology within a developing country organisational context. In particular, the model is based on the work of Abdul-Gader (1992) and Al-Abdul-Gader and Alangari (1994) which asserted that the failure (or little utilisation) of IT systems is attributed to the following factors:

- Lack or little top management support for IT;
- Inadequate IT training;
- Lack or little user participation in IT applications' development.

The Impact Model has incorporated existing theories and models on organisational knowledge management to strengthen the findings and the validity of the proposed research. This research initially identified eleven factors (see Table 3.1). However, after the first validation only seven of the eleven factors rated by experts to have major influence on the use of the Intranet within the Omani companies (see Figure 3.1) remained. Furthermore, after the first validation only three of the five enabling conditions are supported by the two min- case studies (see sections 4.3.1 to 4.3.2.2). The reason for this rigorous process of validation is to make sure that the Model is suitable to Omani companies. The findings are used to inform the final questionnaire design. The intention is to effect a refinement of the Model ( see Figure 4.2 and Figure 8.2) following the collection and analysis of the results. From the model it can be seen that knowledge management is a complex issue and cannot be achieved by technology per se. Therefore, this model argues for a consolidated view that balances the technology and other human and organisational factors in the implementation of the Intranet in knowledge management.

Each component of the proposed impact model has been discussed in details in the previous chapters, particularly in chapters two and three.



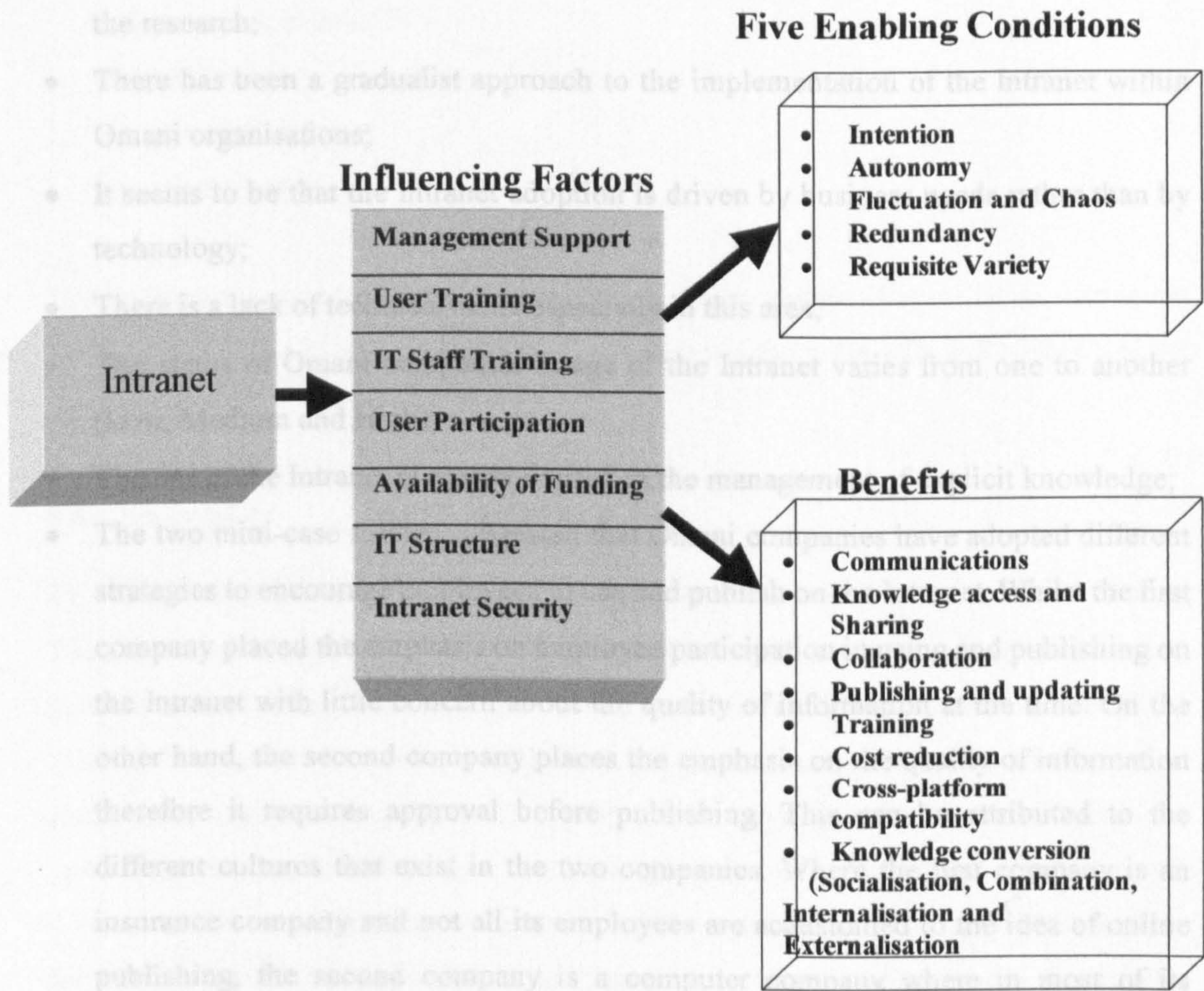


Figure 4.2: The Impact Model

4.5 Summary of Exploratory Study

The major findings from a pilot questionnaire survey (see appendix V) and two mini case studies (see sections 4.3.1 and 4.3.2) are highlighted below:

- Lack of literature in this area and a consequent lack of clear guidance for the Omani companies;
- Confirmation of the need for such research in Oman;



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- Highlighting the issues which need to be addressed by the research;
- Confirmation of the applicability and initial support of the theoretical approach for the research;
- There has been a gradualist approach to the implementation of the Intranet within Omani organisations;
- It seems to be that the Intranet adoption is driven by business needs rather than by technology;
- There is a lack of technical skills especially in this area;
- The status of Omani companies' usage of the Intranet varies from one to another (Low, Medium and High);
- The use of the Intranet is mostly limited to the management of explicit knowledge;
- The two mini-case studies suggested that Omani companies have adopted different strategies to encourage employees to use and publish on the Intranet. Whilst the first company placed the emphasis on employee participation in using and publishing on the Intranet with little concern about the quality of information at the time. On the other hand, the second company places the emphasis on the quality of information therefore it requires approval before publishing. This can be attributed to the different cultures that exist in the two companies. Where the first company is an insurance company and not all its employees are accustomed to the idea of online publishing, the second company is a computer company where in most of its employees are familiar with it (to online publishing). Furthermore, the second company has a successful history with IT, while the first did not. Accordingly the two companies have adopted different strategies to best utilise the Intranet;
- There is a consistent and coherent agreement amongst the participants that Management Support, IT Staff Training and User Participation play an important role in influencing the use of the Intranet within Omani companies. The pilot survey indicated a high degree of correlation between the presence of these factors and the level of Intranet usage. This finding suggests that ignorance of these factors may lead to ( poor utilisation )and low level of the Intranet usage by Omani companies;



- The pilot survey suggests that 75% of the variation of Intranet usage level (Low, Medium and High) within the Omani companies is attributed to the following factors (see Appendix IV):
  1. IT Staff Training.
  2. Management Support.
  3. User Participation.

The findings are used to inform the final questionnaire design. The intention is to effect a refinement of the Model ( see Figure 4.2) following the collection and analysis of the results.

## **4.6 Summary**

This chapter has discussed the steps and the processes, which drive the Research Model. The research strategy is based on the Declared and Validated Approach which means that theoretical framework must be known beforehand. However, validation of the theoretical approach has to be done before full work is carried out. The two mini-case studies and a pilot survey illustrate the Omani experience with the use of Intranet in knowledge management activities. The findings from the literature review together with the two mini case studies and pilot survey, led to the development of and initial support for the Impact Model. This theoretical framework will be further tested empirically during the full work presented in Chapters Six and Seven. In the next chapter (Chapter Five) an appropriate method to collect data for this research is discussed.



## **Chapter Five**

### **Research Methodology and Methods**

#### **5.1 Introduction**

The previous chapter has laid the foundation for this study by establishing a link between literature review and the proposed theoretical framework. Furthermore, to satisfy the **Declared and Validated Approach**, two min-case studies and a pilot survey were conducted to validate the theoretical framework. The purpose of this chapter is to discuss research methodology and data collection methods and to select an appropriate one to achieve the research objectives.

#### **5.2 Research in Information Systems**

The emergence of information systems as a new academic discipline has addressed the use of information technology in a social and organisational context. The main objective of information systems research concerns the relationship between people, organisations, and system usage whilst identifying its impact on and benefit to users. One of the main focuses of information systems research is merely to address the linkage between the system used and the social and organisational issues within which the system exists.

Several empirical studies suggest that the success and failure of information systems depends on the social and organisational surroundings within which the system is used (Benynon-Davies, 1995; McBride, 1997; Poulmenakou and Holmes, 1996). There are a number of scholars and researchers who have explored and contributed to the development of the methodology of information systems research over the past years (Benbasat et al, 1987; Gable, 1994; Willcocks et al., 1996; Walsham, 1995). There are two main paradigms suitable to the study of information systems. Traditionally, information systems research was dominated by the positivist (or quantitative) paradigm which it is claimed used a



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scientific objective approach in finding the fact. The emergence of the interpretative (qualitative) approach which concentrates on a subjective understanding of the relationship between human and organisational factors and the use of information systems has intensified the debate amongst scholars about the suitability of each paradigm for studying information systems. The debate between scholars studying each methodology's strengths and weaknesses has consequently led to the emergence and suitability of a combination of both quantitative and qualitative approaches to study information systems. Many researchers have urged for suitability of combining both approaches to achieve a promising outcome (Bryman, 1996; Gable, 1994; Tashakkori and Teddlie, 1998; Willcocks et al., 1996). The combination of both paradigms is an attempt to acquire both an objective view of the events which emphasise the quantitative approach and the subjective interpretation of the participants which the emphasise of the qualitative paradigm.

The main objectives of the study are to investigate the impact of the Intranet on knowledge management and at the same time to identify and examine factors which are common amongst the Omani organisations which lead one organisation to make higher use of the Intranet than others. This should enable a general statement about Omani organisations to be provided which can be served better by a quantitative approach according to (Gable, 1994). Furthermore, to enrich the findings and to study the phenomenon at its natural setting which can be served better by a qualitative approach (McBride, 1997). Therefore, the research strategy is based on a combined approach. Through the strategy of multiple paradigms, the robustness of results can be increased and cross-validation can be achieved when information is gathered via different sources (Gable, 1994). This process which is also called triangulation (Jik, 1989) helps reduce the impact of bias, enhance data accuracy and validity and consequently improve the result of the research. Each paradigm has weaknesses and strengths (see sections 5.3.1 and 5.4 and Table 5.1). Combining known facts gathered from both quantitative and qualitative approaches lead to more facts being established. This is bound to reinforce the result gained in sections ( 3.5 and 4.3 to 4.4).

### **5.3 The Qualitative Approach**

The qualitative paradigm has been defined by Van Maanen (1983, p.9) as *"an array of interpretive techniques which seek to describe, decode, translate and otherwise come to terms with the meaning of what is observed, not the frequency of occurrence"*.

The qualitative paradigm utilises different methods to gather information about certain phenomena. These methods include, participant observers and case studies along with structured and semi-structured interviews (Jorgensen, 1989; Remenyi and Williams, 1995).

#### **5.3.1 Case Study**

Even though the use of case studies is not a widely used method within the field of information systems (Myers, 1997; Walsham, 1995), many researchers are arguing the suitability and use of case studies in this area (Benbasat et al., 1987; Willcocks et al., 1996; Walsham, 1995). Case studies usually concentrate on a single, or on a very limited number of organisations and seek an in-depth understanding of a phenomenon including an understanding of the context in which it occurs (Gable, 1994; Walsham, 1995).

Benbasat et al (1987) identified three reasons for the use of the case study in information systems:

- The investigator can study information systems in natural organisational settings. This is advantageous, as it is very difficult to separate information systems and information technology from the people who are using them in a specific organisational environment;
- The case study allows the investigator to seek answers for 'how' and 'why' questions. For instance, how the Omani firms have implemented the Intranet? And why?;
- A case study method is a suitable way to investigate a topic in which little previous research has been conducted.



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One of the most important advantages of case studies is that the researcher conducting the interview may discover things that were not even considered before interacting with an interviewee and which cannot be discovered by survey (Gonzalez, 1998).

The weakness of the case study is that the result may be peculiar only to the organisations that have been studied; and generalisation may not be possible (Gable, 1994). Other disadvantages are that the case study is time consuming and labour intensive (Gonzalez, 1998).

One problem to be considered when using the case study is that people in developing countries are reluctant, and often refuse, to be interviewed, especially when dealing with sensitive information because of the fear that the information will be used against them or their organisations. Even though assurances are given to participants that the data collected will be used only for academic purposes and will not be used to harm either the participants or the organisations. For this reason it is impossible to rely only on case studies for data collection. Therefore, a case study is used to enrich and complement the questionnaire survey.

Yin (1989) argues that data collection for case studies may come from different sources: documents, participant observers, direct observation, archival records, interviews and physical artifacts. According to Walsham (1995), interviews are the most important (primary) data collection method. There are drawbacks in the other methods (see sections 5.3.2, 5.5.1 and 5.5.2) that makes interviews the most effective achieving the objectives of the research.

### **5.3.2 Participant Observer**

Participant observation is one of the most important methods of data collection within qualitative research. It is especially appropriate when little is known about the research phenomena (Bryman, 1996; Jorgensen, 1989). The purpose of the participant observer in the first stage of an inquiry is to define the problem precisely and focus on the meaning of the events from the standpoint of the insiders (Jorgensen, 1989). At the early stage of investigation, the participant observer gather information through observation, casual

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conversation and informal interview (Jorgensen, 1989). *"Through participant observation, it is possible to describe what goes on, who or what is involved, when and where things happen, how they occur, and why, at least from the standpoint of participants, things happen as they do in particular situations"* (Jorgensen, 1989, p.12). This method of gathering evidence is particularly important to enrich further investigations. However, there are drawbacks. *"When individuals or groups become aware that they are being observed, they may change their behaviour. There is always possibility of bias and incomplete observation and/or recording"* (Kumar, 1999, p.106).

### **5.3.3 Structured and Unstructured Interviews**

Participant observer by no means is the only method to collect data in the qualitative paradigm. Structured and semi structured interviews are commonly used methods for collecting data. Walsham (1995) argues that interviews are the main source for collecting data about certain phenomenon. In the words of Walsham(1995, p.78) *"it can be argued that interviews are the primary data sources, since it is through this method that the researcher can best access the interpretations that participants have regarding the actions and events which have or are taking place, and the views and aspirations of themselves and other participants"*. Furthermore, Jorgensen, (1989) made distinction between two types of interview; one formal and the other informal. An informal interview is like a casual conversation. However, it differs from casual conversation through the use of a question and answer format (Jorgensen, 1989). The researcher provides minimal guidance and allows considerable latitude for interviewees in applying an informal interview (Bryman, 1996).

A formal interview on the other hand is characterised by a standard set and structured schedule of questions. The researcher asks specific questions in exactly the same way, time after time, with different participants (Jorgensen, 1989). Formal, unlike informal interviews, requires the asking of the same questions in exactly the same way each time. Usually researchers use formal and informal interviews to complement participant observer (Jorgensen, 1989).



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The purpose of different qualitative methods of data collection is to get close to the phenomenon being investigated and to collect insight details and rich data.

### **5.4 The Quantitative Approach**

The quantitative paradigm refers to a process by which results are derived (arrived at) by means of statistical procedures or other means of quantification (Strass and Corbin, 1990; Cornford and Smithson, 1996). The questionnaire survey is the main method of data collection in a quantitative paradigm (Bryman, 1996). The survey questionnaire method is also very popular and a widely used method in research.

The advantages of using a survey questionnaire are:

- The ability to detect relationships that are common across the organisations and hence to provide generalisable statements about the object under study (Gable, 1994);
- It exhibits considerable precision in collecting and reporting data (Bryman, 1996; Ganzalez, 1998; Remenyi and Williams, 1995);
- It is considered an inexpensive approach to gathering data (Remenyi and Williams, 1995);
- The use of the questionnaire also has the advantage of overcoming cultural factors. For example, it is part of the Arab culture that personal, family or business information should not be discussed outside the boundaries of the family or the company as such matters are viewed as being private (Al-Assaf, 1997; Al-Qahtany, 1996; Al-Shuabi, 1991). The respondents to questionnaire survey, therefore, may offer greater credibility, as participants do not have to identify themselves or their organisations.

This explains why this research opts for the use of a questionnaire survey as the main data collection method. However there are disadvantages, which can be summarised as follows:



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- The survey gives only a snap-shot of the situation at a certain time, yielding little information by which to understand the meaning of the data (Gable (1994);
- Some variables of interest to the researcher may not be measurable by the survey method Gable (1994).

These drawbacks can be diminished considerably by the inclusion of other data collection techniques, such as the case study, which is the strategy of this study.

Table 5.1 summarises the relative strengths and weakness of the case study and survey methods.

	Survey (e.g questionnaires)	Case study
Controllability	Medium	Low
Deductibility	Medium	Low
Repeatability	Medium	Low
Generalisability	High	Low
Discoverability	Medium	High
Representability	Medium	High

Table 5.1: has been adopted from Gable, G.,(1994).

**5.5 Other Methods**

The researcher has looked at other methods of data collection, but has decided they were not appropriate for this research. These methods are discussed below.

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### **5.6 Diary**

The diary technique is another method of collecting data. It involves asking participants to keep a record of events at the time they occur (Rosnow and Rosenthal, 1993). Alternatively the researcher records the event as it occurs. This however, is a time-consuming process. This technique of data collection was considered inappropriate for this study due to the fact that the researcher himself would neither involve nor have control of the process of data recording. The researcher would have to depend on employees in different Omani Companies to record the data for him, and consequently, there would be a greater chance of the recording of insufficient detail data. Furthermore, there was a difficulty of finding someone to record the events on behalf of the researcher. Therefore this technique was considered as being inappropriate for this research.

#### **5.6.2 Archival Records**

This method of collecting data involves reviewing records and documents. Records and documents can be classified into two types: Public and Private. Public records include political and judicial records, government documents, mass media reports, and professional journals and business magazines. Private records represent the organisational records.

There are two important limitations of this method of data collection:

- The difficulty in obtaining organisational records, especially in Oman;
- The data in the records is usually outdated.

Therefore, this method was not considered suitable for this study.

### **5.7 A Combination of Two Methods (Quantitative and Qualitative)**

The combination of methods or 'mixed method studies' defined by Tashakkori and Teddlie (1998, p.17-18) is "*those that combined the qualitative and quantitative approaches into the research methodology of a single study or multiphased study*". Tashakkori and Teddlie took the discussion further by claiming that the best paradigm is the use of the mixed



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method approach. It has been urged that there is no universally best method of carrying out research whether studying social or natural sciences, and moreover, no particular paradigm has been recognised as being inferior or superior especially in information systems/ information technology (Gable, 1994; Remenyi and Williams, 1995). Selecting one paradigm over another will result in sacrifice and trade-offs. Hammersley (1992) observed that seeking greater precision in selecting a quantitative approach would be likely to sacrifice the breadth of description in the qualitative method and vice versa. Consequently, according to Gable (1994) and Willcocks et al (1996), the case for combining both 'hard' and 'soft' paradigms in studying information systems is very strong. Basically, the survey (hard) seeks to uncover relationships and the case study (soft) to explain such relationships (Gonzalez, 1998). Furthermore, Gable (1994, p.124) states “ *to combine the main strength of survey research (generalisability / external validity) with main strength of experimentation (internal validity through random assignment to conditions) and with case studies (model complexity and discoverability) can yield a superior piece of research*”. Therefore, the combination of case studies and survey questionnaire methods is justifiable and suitable to achieve the research objectives due to the following:

- Benbasat et al (1987) stated that the case study is appropriate where few previous studies have been carried out and the technology is new, which is the case in this research;
- This study is concerned with discovering relationships that are common across Omani organisations and provide generalisable statements. Surveys were successfully used in similar studies (Gable, 1994);
- The use of two paradigms is appropriate for this research, the qualitative approach allows an intensive investigation of one or a few organisations (Benbasat et al (1987). The quantitative method, provides (enables) generalisation about common relationships between large numbers of organisations (Gable, 1994).

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- By adopting the two paradigms the result gained were reinforced (see sections 3.5 and 4.3 to 4.5) consequently this approach was used.

In the light of this, the research strategy is based on the use of a questionnaire survey as the main method complimented by a detailed one-case study.

### **5.7 Survey Application Development**

A survey-based questionnaire was used to collect data from two participants in each organisation who were involved in the adoption and/ or implementation of an Intranet in their organisations.

#### **5.7.1 Questionnaire Design**

The aim of the questionnaire was to collect data in order to achieve the objectives set for this research. The organisations used had to satisfy the following conditions:

- The organisation is profit making ( due to the focus of this research on Omani private sector(see section 1.8.2.1) ;
- The organisation has been using the Intranet for at least six months (in order to obtain sufficient detail about the use and impact).

The questionnaire was designed after extensive survey of the literature and a preliminary visit to two organisations which have adopted the Intranet in order to obtain comment and input for the questionnaire. The aim is that the questionnaire is not simply a form to be filled in, it is a tool or instrument for the collection of data for a particular purpose (Oppenheim, 1992). The basic premises for its design embrace are those given by (Oppenheim, 1992) and are summarised as:

- The questions were designed to be short and easy to understand in order for the participants to answer them without any difficulty;



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- The terminology used in the questionnaire is clear and unambiguous to prevent misinterpretation and misunderstanding of the questions;
- The questionnaire's length must be kept to a minimum in order to motivate the participants to answer all of it with full concentration;
- Most, but not all of the questions are close-end questions, which allows the participants to select from the given options and are easier and quicker to answer;
- The names and the addresses of the participants are not asked for in order to assure the participants of confidentiality;
- Oppenheim(1992) suggested that the questionnaire should include some open-ended questions because it gives the participants the opportunity for a free and spontaneous answer. (See Appendix II).

A covering letter should be attached (See Appendix II) which contains the following:

- An explanation of the purpose of the questionnaire;
- An assurance that confidentiality will be maintained and the data will be used for academic purposes only;
- A note of thanks to the participants for their effort and time in completing the questionnaire;
- A request that the participants make suggestions and modifications to the questionnaire, which they feel appropriate in order to, achieve the objectives of the study;
- During the pilot testing the participants were asked to record the time it took them to complete the questionnaire;
- A definition of the subject, in this case Intranet and Knowledge Management was provided.

The questionnaire was divided into four main sections (see Appendix II); section 1 is the background information about the organisation; section 2 is about the use of the Intranet

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within the Omani companies; section 3 is about the factors influence the use of the Intranet within the Omani organisations and the fourth section consists of open ended questions.

Many measures for the survey were adapted from the established research rather than directly adopted. The three levels of the Intranet usage defined by the Gartner Group (1996) were used and operationalised by providing the respondents with definitions of the Intranet deployment levels, and asking them to select which level is more appropriate to their organisations.

Some questions to measure the factors that influence the use of the Intranet were derived from Edger's work (1998), for example the four questions to measure top management support. Top managers' support ( for the use of the Intranet in the organisation, considered the Intranet as critical to the organisation, Intranet integration with other systems, and for the resources needed for the Intranet deployment and enhancement).

The researcher felt that a literature review was not sufficient to identify the factors, therefore, expert opinion was sought to reach a final list of factors that are appropriate to Omani organisations. See Chapter Four for more details regarding the selection of factors. Since English is the business language in Oman, the questionnaire was designed, tested and piloted in English.

## **5.8 Pilot Testing**

This research utilises both case studies and survey methods, consequently pilot testing was done in two phases:

### **5.8.1 Pilot Case Studies**

The researcher spent two weeks with two organisations as a participant observer to get to insiders' views; identify concepts and define the research problem. During this period the researcher was able to arrange for the four unstructured and semi structured interviews.



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The interviews were conducted with four IT professionals in two private sector Omani companies between the 1<sup>st</sup> and the 26 of April 1999. The participants were an IT director, an IT deputy director and the Head of the Intranet applications. The result of the interviews was the two mini case-studies reported in detail in Chapter Four.

The purposes of the pilot case studies were twofold:

- To test the validity and the suitability of the Research Model developed in the previous chapters. Therefore relating the theory to Omani companies' practice;
- To develop more ideas and to provide insight into the basic issues being studied which can thus be included in the questionnaire.

The case pilot study was conducted before the pilot survey in accordance with the practice suggested by Attewell and Rule (1991, p.314) and advocated by Gable (1994). *“It makes sense to do fieldwork first. Getting close to the phenomenon – gathering insights or discoveries about causal links, motivations, reasons why things happened – should precede verification by more objective techniques, such as surveys”* (Gable, 1994, p.119).

The case studies were very useful in obtaining input for the questionnaire design and revision.

### **5.8.2 Questionnaire Validation**

In order to validate the questionnaire pilot testing is recommended (Oppenheim, 1992; Remenyi and Williams, 1995). According to Remenyi and Williams (1995) a pilot study is recommended in order to establish that the proposed questionnaire is intelligible and clear to members of the target population.

Following the above recommendation the questionnaire was further refined through a rigorous process of pre-testing and piloting. The questionnaire was pre-tested and piloted

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with 30 (14 for pre testing and 16 for pilot testing) IT professionals, academics and IS researchers in Oman and UK. The questionnaire was also pre-tested with 4 academics and IS researchers in Oman and UK in order to establish content validity. The participants in the pre-testing and piloting of the questionnaire were asked to give their comments on the adequacy of the questions. The pre-testing of the questionnaire focused on issues such as clarity, wording and content validity (Cronbach's alpha was used to analyse the questionnaire's internal consistency see Chapter Six). The pilot testing aims include:

- Do participants understand the questions?;
- Do different respondents interpret questions differently?;
- Is the questionnaire too long, too short or reasonable?.

The questionnaire was pilot tested with 16 IT professionals (IT Directors, Knowledge Management Directors and Heads of Internet and Intranet Applications) representing eight Omani private sector companies and Microsoft Dubai attending the Computer Exhibition and Intranet seminar held in Muscat in April 1999. The participants were involved in the implementation of the Intranet in their organisations. The pilot test was conducted in person by the researcher, however, the participants completed the questionnaire in the absence of the researcher. The participants were asked to make a note of any difficulty in understanding any question and of any suggestion, modification and enhancement to the questionnaire which they felt appropriate. Immediately after completion the participants were interviewed to hear their comments and suggestions concerning the questionnaire.

The major conclusions from the pre-testing and piloting study can be summarised in the following:

- Generally speaking, the participants in the pilot study were satisfied with the questionnaire;
- Some questions were added to the questionnaire based on the participants suggestions;



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- Some wordings were changed;
- It was observed from the case studies and the pilot test that more than one person is knowledgeable about the Intranet in each organisation. Therefore, based on this finding the questionnaire was to be distributed to 2 participants in each organisation during the main data collection phase.

This rigorous process of pre-testing and piloting as part of the instrument development phase of the research resulted in a significant improvement in the questionnaire and provided support for content validity of the empirical research.

### **5.8.3 The Benefit of the Pilot Testing**

The benefit of the pilot test in partially validating the Impact Model is to fit it more accurately for the Omani organisational context. (For more detail see sections 3.5 and 4.3.1- 4.3.2.2). Furthermore, the findings are used to inform the final questionnaire design. For example original questions were omitted and new questions added( see Appendix II and V).

Following the pilot, the strategy for the main data collection phase was maintained, namely the case study and survey method. Comments on the strategy and benefits to be gained follow.

## **5.9 Main Data Collection**

### **5.9.1 Case Studies**

One detailed case study was conducted with one Omani organisation (See Chapter Seven). The study was mainly focussed on one organisation to allow for a breadth of description and rich level of investigation and analysis. Semi-structured interviews were conducted with the IT director, the IT deputy director, the knowledge management director and heads of Intranet applications, the senior information advisor and members of a steering committee who participated in the adoption of the Intranet. These people were chosen for the interviews due to the fact that they are the most knowledgeable in the area related to

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this work in their organisations. Walsham (1995) argues that the interviews are the main data source in case studies. *"Since it is through this method that the researcher can best access the interpretations that participants have regarding the actions and events which have or are taking place, and the views and aspirations of themselves and other participants"* (Walsham, 1995, p.78). In addition the interviewer has the opportunity to get closer to the phenomena under investigation, and to explain and clear up misunderstanding and provide definitions (Oppehiem, 1992). In support of this view (Burgess, 1982, p.107) states that *"the interview is the opportunity for the researcher to probe deeply to uncover new clues, open up new dimensions of the problem and to secure vivid, accurate inclusive accounts that are based on personal experience"*. The interaction between the interviewer and interviewees allows discovery of aspects previously not thought off and which cannot be detected through the use of survey. Furthermore, the use of the case study is an opportunity for observation, clarification and detailed explanation during the interaction between the interviewer and the interviewees. Open-ended questions (See Appendix III) for the purpose of this case study have been developed and revised following the pilot case studies in Oman.

The most important reason for selecting this particular company for the case study over others was the access to data. In other words, the staff concerned have agreed to participate in the study.

Many interviews were conducted with the participants mentioned over a period of six months. Some participants refused the idea of recording the interview, therefore, the researcher had to take notes as much as possible, however, it was difficult to capture all the data. The researcher had to write these notes up in full immediately after the interview as suggested by Walsham (1995). According to Walsham (1995, p.79) *"the main alternative to tape-recording is to make rough but extensive notes during the interviews, and to write them up in full as soon as possible after interviews"*. However, in many cases the researcher had to ask for a second interview to capture lost details and to confirm the notes.



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This is of course a tedious and time consuming process. With those who agreed to be recorded the process of capturing and writing up the data was somewhat easier.

The results of the case study are discussed in great detail in Chapter Seven.

### **5.9.2 Survey Questionnaire**

The survey questionnaire was distributed to all Omani private sector organisations that have adopted the Intranet and have at least six months experience of using it.

#### **5.9.2.1 Population Sample**

The population in Oman is not large enough to allow random sampling due to the fact the Intranet is a new phenomenon. Therefore, purposeful sampling was used to collect data (Patton, 1990). The purposeful sampling included all Omani private companies that have adopted the Intranet. *"The primary consideration in purposeful sampling is the judgement of the researcher as to who can provide the best information to achieve the objectives of the study"*(Kumar, 1999, p.162). This type of sampling is extremely useful when studying a phenomenon about which only a little is known (Ibid).

#### **5.9.2.2 Distribution of the Questionnaire**

The questionnaires were distributed in person by the researcher for the following reasons:

- The use of a mail survey was not practical in a developing country, because it takes a very long time and the response rate is very low;
- The interviewer has an opportunity to motivate the participants to complete the questionnaire;
- Observation can be used as the third instrument in the research to strengthen the outcomes;
- It was reported by Oppenheim (1992) that a self administered questionnaire not only ensures a high response rate, and minimum of interviewer bias, but gives the benefit of

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a degree of personal contact and therefore, permits interviewer assessments, providing some necessary explanations.

A two-stage data collection plan was used. The first stage involved identifying target organisations for data collection process. The IT directors of 200 companies in Oman were identified as having an Intranet from the Directory of the Chamber's of Commerce and the researcher contacts. These professionals were directly contacted by telephone to determine the status of the Intranet development in their organisations. Out of 200 companies, 50 companies met the criteria set (see section 5.7.1). The researcher delivered 100 questionnaires to 50 private sector organisations that were known to have adopted the Intranet and have at least six months experience using the Intranet and who had agreed to participate in the study.

After three weeks from the delivery of the questionnaires, forty were completed and collected. The researcher used email and telephone calls to remind and encourage the rest of the organisations to complete the questionnaires. After four weeks sixty questionnaires were completed and collected. In order to increase the response rate more calls were made to encourage those organisations that had not completed the questionnaires. This process was very tedious and time consuming, more than fifty hours were spent on telephone calls and email letters to remind and encourage participants to complete the questionnaires. Furthermore, a lot of visits were made in the hope that the questionnaires were ready for collection as promised by participants, however, many times the researcher returned empty handed.

### **5.9.3 Response Rate**

Six weeks from the delivery of the questionnaires a total of 84 questionnaires were returned, representing a response rate of 84%. However, 80 valid responses were entered and analysed. The remainder, 4 questionnaires, were considered not useful due to the fact that many questions were not answered, therefore, they were excluded from analysis.



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The participants represented 42 (84% of the total population) Omani private sector organisations that have adopted the Intranet and agreed to participate in the study.

The decision to deliver and collect the questionnaires by the researcher was worth the trouble because not only did it ensure a high response rate but it also permitted direct observation.

### **5.9.4 Analysis of the Questionnaire**

Statistical means, such as descriptive statistic, correlation analysis and regression techniques, were used to analyse the questionnaire data. Software programs such Microsoft Excel and SPSS (Statistical Package for Social Sciences) were used in the analysis. The result of the analysis is presented in Chapter Six. An overview of the research methodology model is given diagrammatically in Figure 5.1.

5.10 Summary

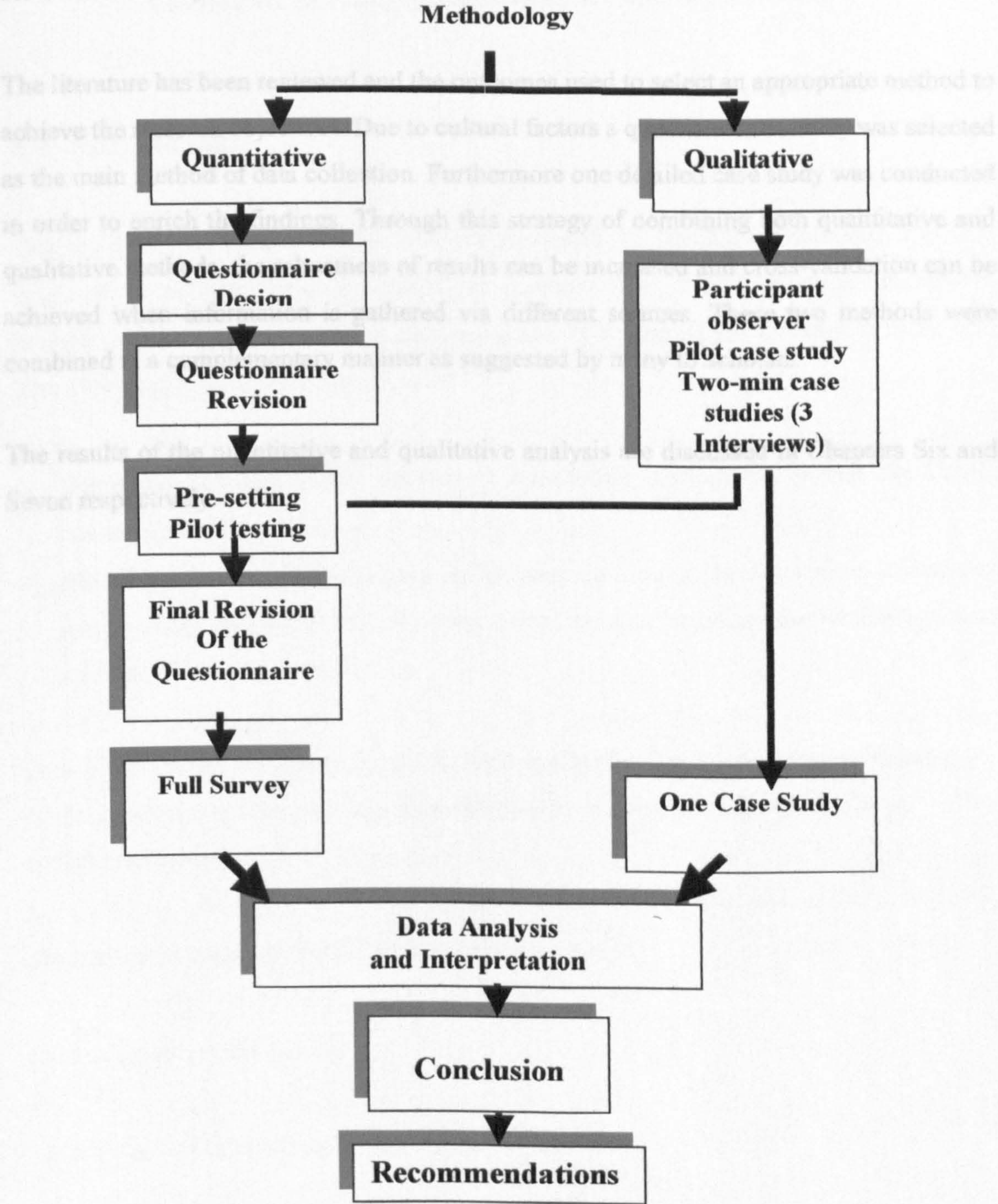


Figure: 5.1: Methodology Model for this Research



## **5.10 Summary**

The literature has been reviewed and the outcomes used to select an appropriate method to achieve the research objectives. Due to cultural factors a questionnaire survey was selected as the main method of data collection. Furthermore one detailed case study was conducted in order to enrich the findings. Through this strategy of combining both quantitative and qualitative methods, the robustness of results can be increased and cross-validation can be achieved when information is gathered via different sources. These two methods were combined in a complementary manner as suggested by many IS scholars.

The results of the quantitative and qualitative analysis are discussed in Chapters Six and Seven respectively.

## **Chapter Six**

### **Analysis of the Quantitative Survey Results**

#### **6.1 Introduction**

Chapter Five has discussed the research approach to the data collection, which is employed to achieve the objectives of the research. This chapter presents quantitative analysis and interpretation of the data collected by means of the questionnaire survey. The main objective of the research is to:

- Investigate the use of the Intranet in knowledge management within the Omani business context;
- Identify and examine the factors influencing the use of the Intranet in knowledge management and make one company better be able to utilise the technology than another.

The objectives and the research questions set in Chapter One, as well as the research model presented in Chapter Four, should be borne in mind when analysing the questionnaire survey.

The content is basically divided into three main areas<sup>1</sup>:

- Background information;
- The uses of the Intranet within Omani organisations;
- Factors influencing the use of the Intranet in knowledge management.

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<sup>1</sup> To make it convenient for the readers all Figures and Tables are presented in the body of the Chapter.



### **6.2 Background Information**

This section gives background information about the respondents and their organisations.

#### **6.2.1 The Participants**

Table 6.1 provides information regarding the number of participants in this study as well as their job titles. The researcher delivered 100 questionnaires to 50 Omani private sector organisations that are known to have adopted the Intranet. A total of 84 questionnaires were returned, representing a response rate of 84%. 95% of the collected questionnaires were fully completed and were entered and analysed. The remainder (4 questionnaires) were not fully completed. It was recognised that a mean score may not truly reflect these views of the participants, therefore, they were excluded from analysis. Prior to the analysis the data was checked for accuracy and possible discrepancy when data was transferred from the returned questionnaires to the software.

The participants representing 42 (84% of the total population) Omani private sector organisations that have adopted the Intranet and agreed to participate in the study. The concern in the survey was not the number but the quality of the participants, the objective being to gain detailed insight and thereby an accurate picture of the subject under investigation. It was recognised that only those individuals who had a high degree of managerial responsibility or were directly involved in the development of the Intranet projects would be able to comment knowledgeably about the points raised in the study.

Table 6.1 and Figure 6.1 show the numbers and the job titles of the participants in the study. 50% of the respondents were IT directors (see Figure 6.1).



Job Title	Number of respondent
Director general	1
Deputy director general for IT	2
IT Director	40
Knowledge management officer/ Document Management	3
Head of Intranet/ Internet applications	24
Webmaster/designer/developer	10
Total	80

Table 6.1: Shows the Number and the Title of the Participants

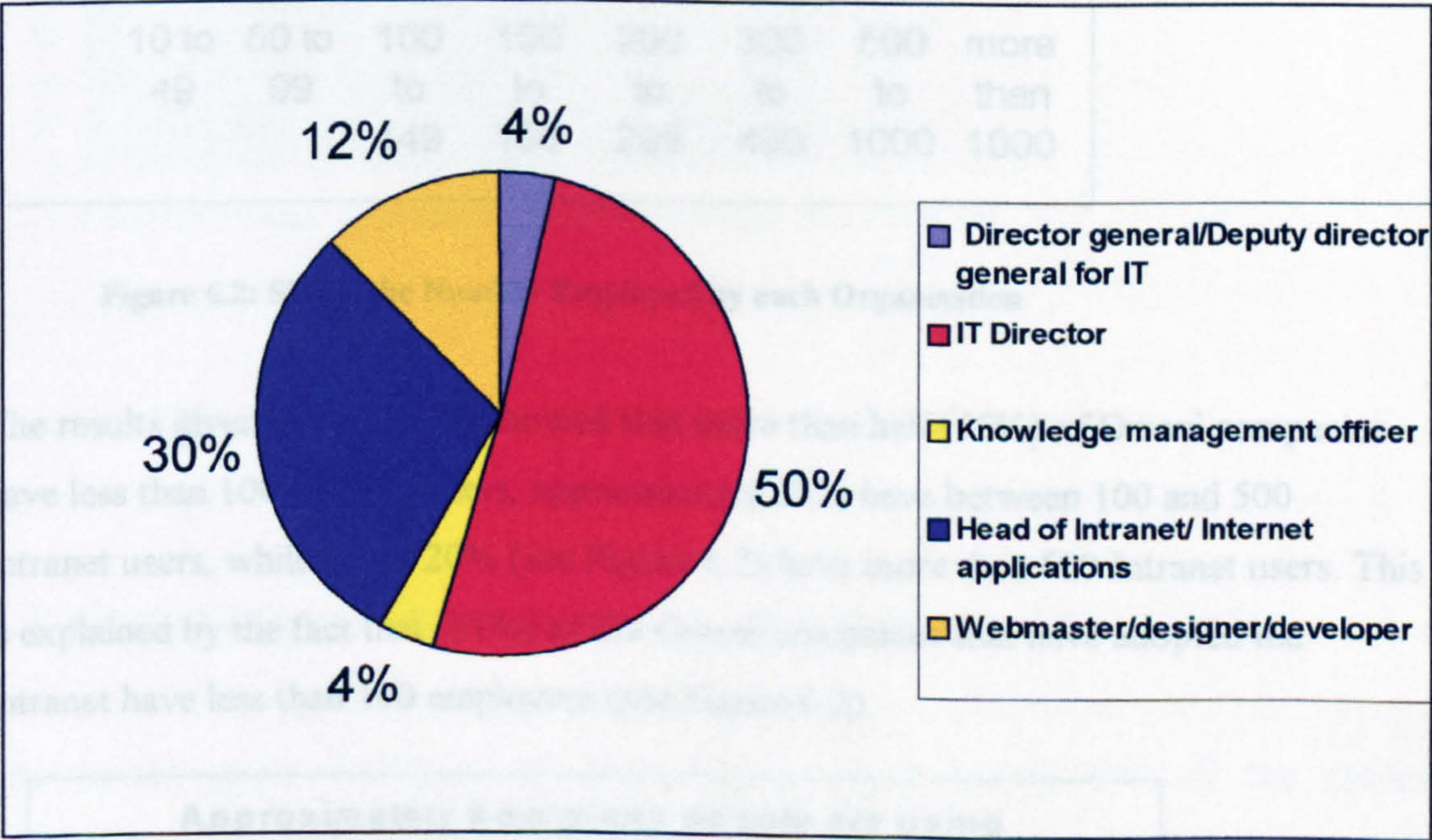
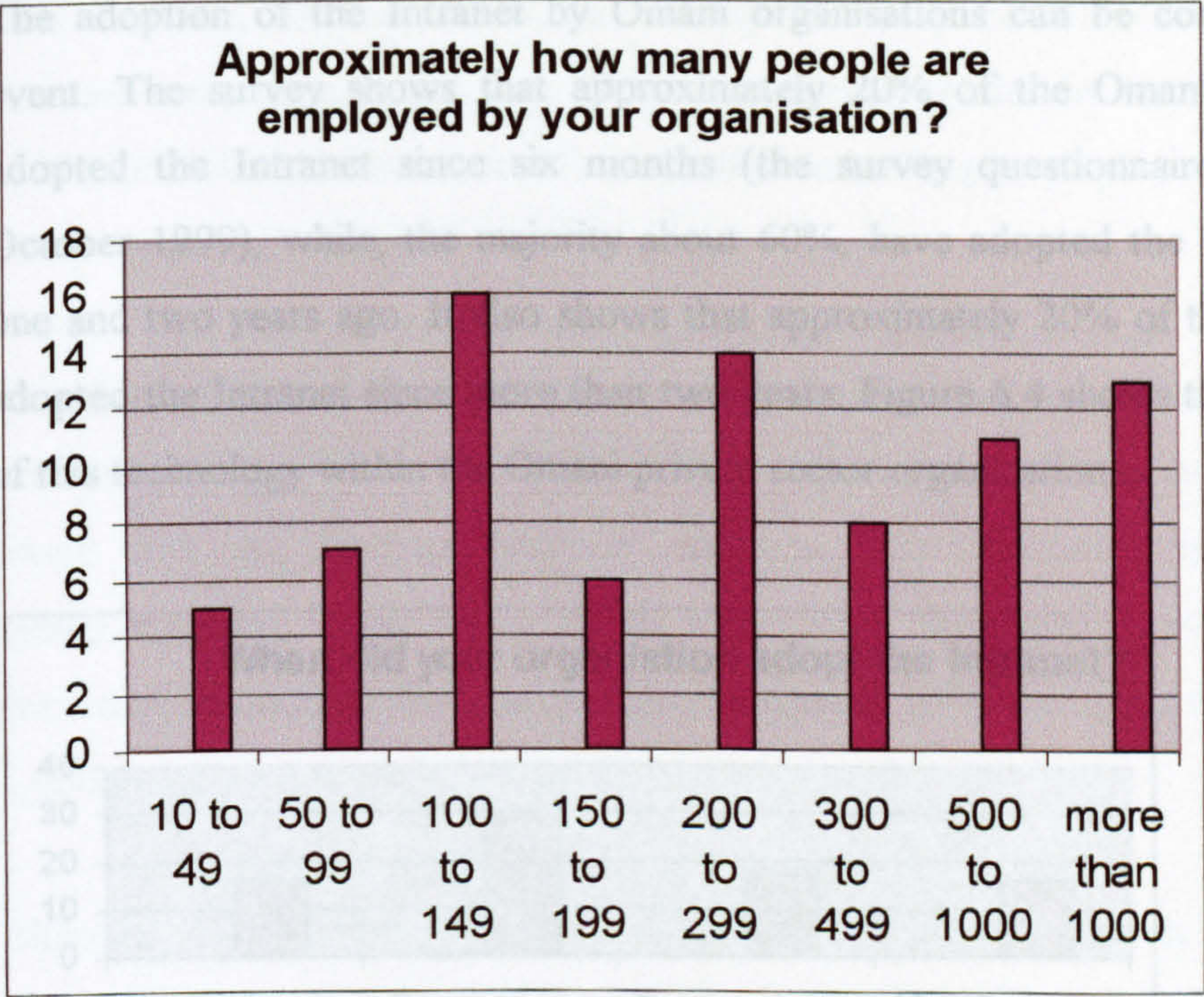


Figure 6.1: Shows the Percentage of Different Job Titles

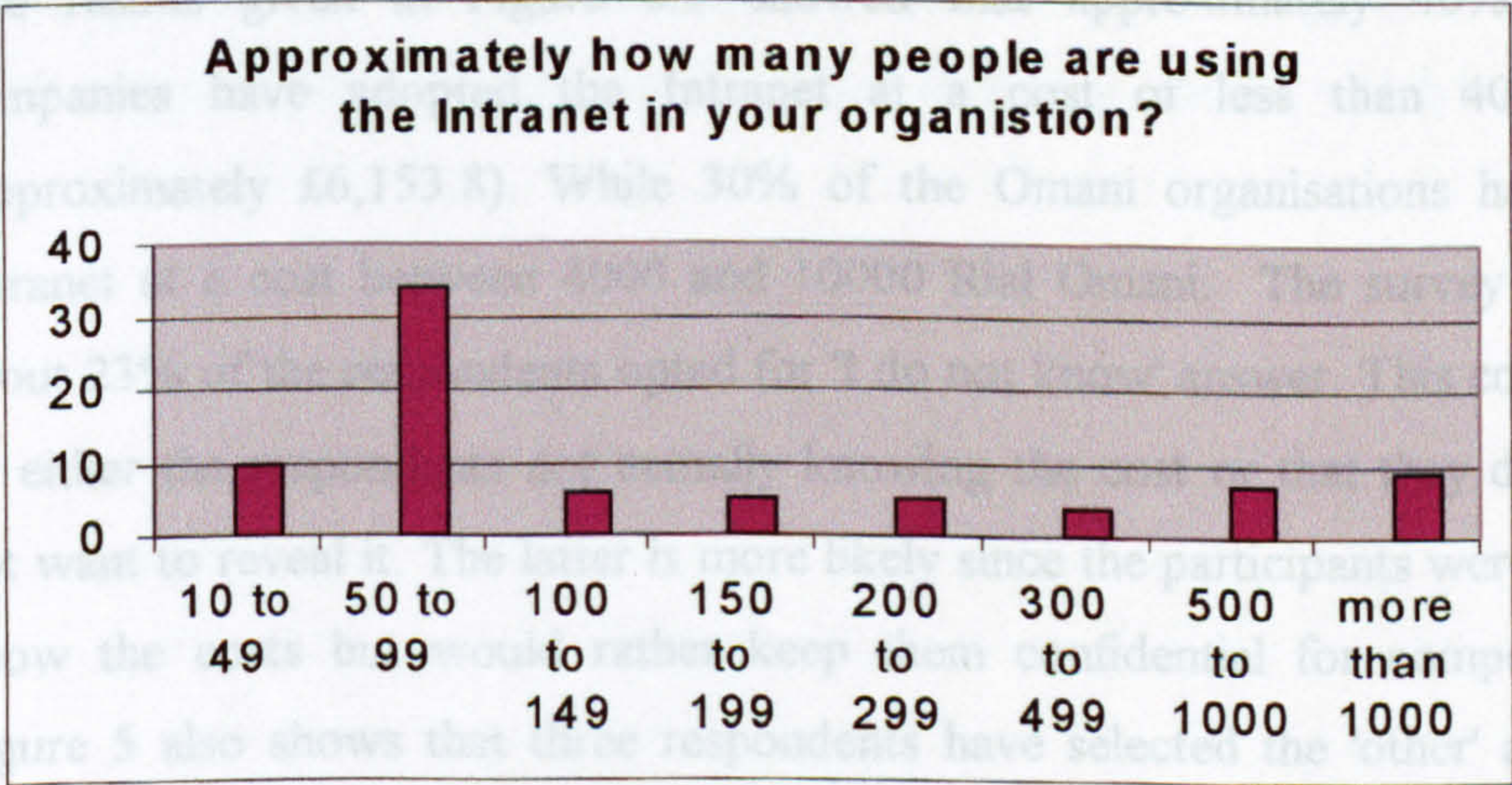
From Figure 6.2 it is seen that approximately 15% of Omani companies participating in this study are small (total employees less than 100), 55% are medium sized (between 100 and<500 employees) and 30% are large (500 and more employees).





**Figure 6.2: Shows the Number Employed by each Organisation**

The results given in Figure 6.3 showed that more than half (55%) of Omani companies have less than 100 Intranet users, approximately 25% have between 100 and 500 Intranet users, while about 20% (see Figure 6.2) have more than 500 Intranet users. This is explained by the fact that (11%) of the Omani companies that have adopted the Intranet have less than 100 employees (see Figure 6.2).



**Figure 6.3: Shows the Number of Intranet Users in each Organisation**



The adoption of the Intranet by Omani organisations can be considered as a recent event. The survey shows that approximately 20% of the Omani organisations have adopted the Intranet since six months (the survey questionnaire was conducted in October 1999), while, the majority about 60%, have adopted the Intranet for between one and two years ago. It also shows that approximately 20% of the Omani companies adopted the Intranet since more than two years. Figure 6.4 shows the recent penetration of this technology within the Omani private sector organisations.

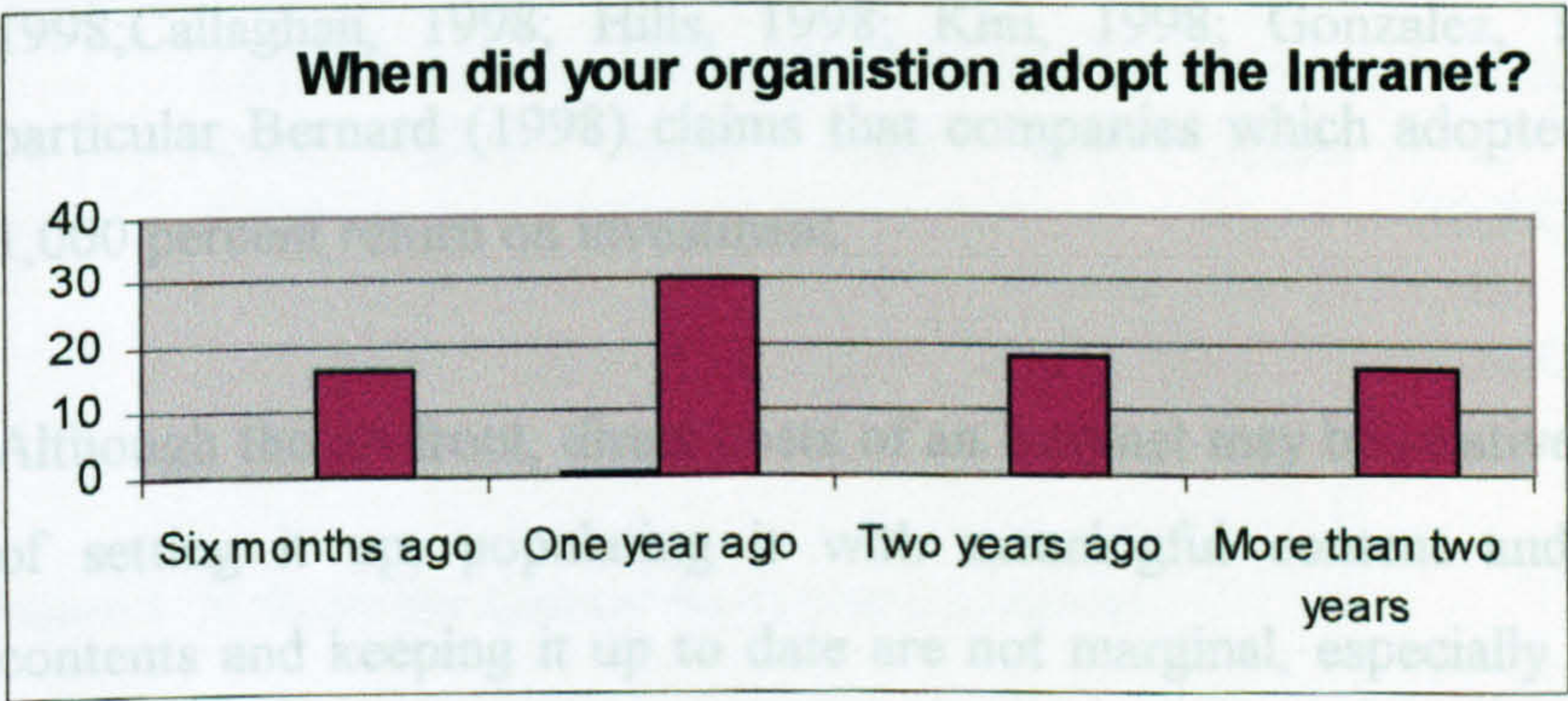


Figure 6.4: Shows Recent Penetration of the Intranet in the Omani Companies

6.3 Cost of Intranet Implementation with the Omani Companies

The results given in Figure 6.5 showed that approximately 40% of the Omani companies have adopted the Intranet at a cost of less than 4000 Rial Omani (approximately £6,153.8). While 30% of the Omani organisations have adopted the Intranet at a cost between 4000 and 10000 Rial Omani. The survey also shows that about 23% of the respondents opted for 'I do not know' answer. This could be explained by either the respondents not actually knowing the cost or that they did know but did not want to reveal it. The latter is more likely since the participants were in a position to know the costs but would rather keep them confidential for competitive purposes. Figure 5 also shows that three respondents have selected the 'other' answer and have provided 22,000, 30,000 and 100,000 as the cost for the Intranet adoption for their companies. The highest cost of about 100000 Omani Rial is for a large company. The



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cost variation between the Omani companies may be attributed to the number of Intranet users in each company. When the cost is divided by the number of employees ( $100000/5000=20$ ) the cost of using the Intranet per employee for that particular company is 20 Omani Rial.

This finding is consistent with the previous findings that stated that Intranet adoption is not costly. In particular the result of the study is in line with previous researchers who found that the cost of Intranet adoption and installation is minimal (Bernard, 1998; Callaghan, 1998; Hills, 1998; Kim, 1998; Gonzalez, 1998; Scott, 1998). In particular Bernard (1998) claims that companies which adopted the Intranet have had 1,000 percent return on investment.

Although the up-front, direct costs of an Intranet may be relatively low, the human costs of setting it up, populating it with meaningful content and then maintaining that contents and keeping it up to date are not marginal, especially when integrating all the applications via the Intranet. According to Curry and Stancich (2000, p.255) "*benefits generated by an intranet not only serve the case for initial development but also the case for sustainability to ensure that the intranet develops into a genuinely value-added tool for the business*".

Hinrichs (1997) argues that the costs of Intranet will rise substantially when the Intranet is integrated with all applications and systems. This integration with the existing applications of course requires qualified and trained personnel, which is costly.



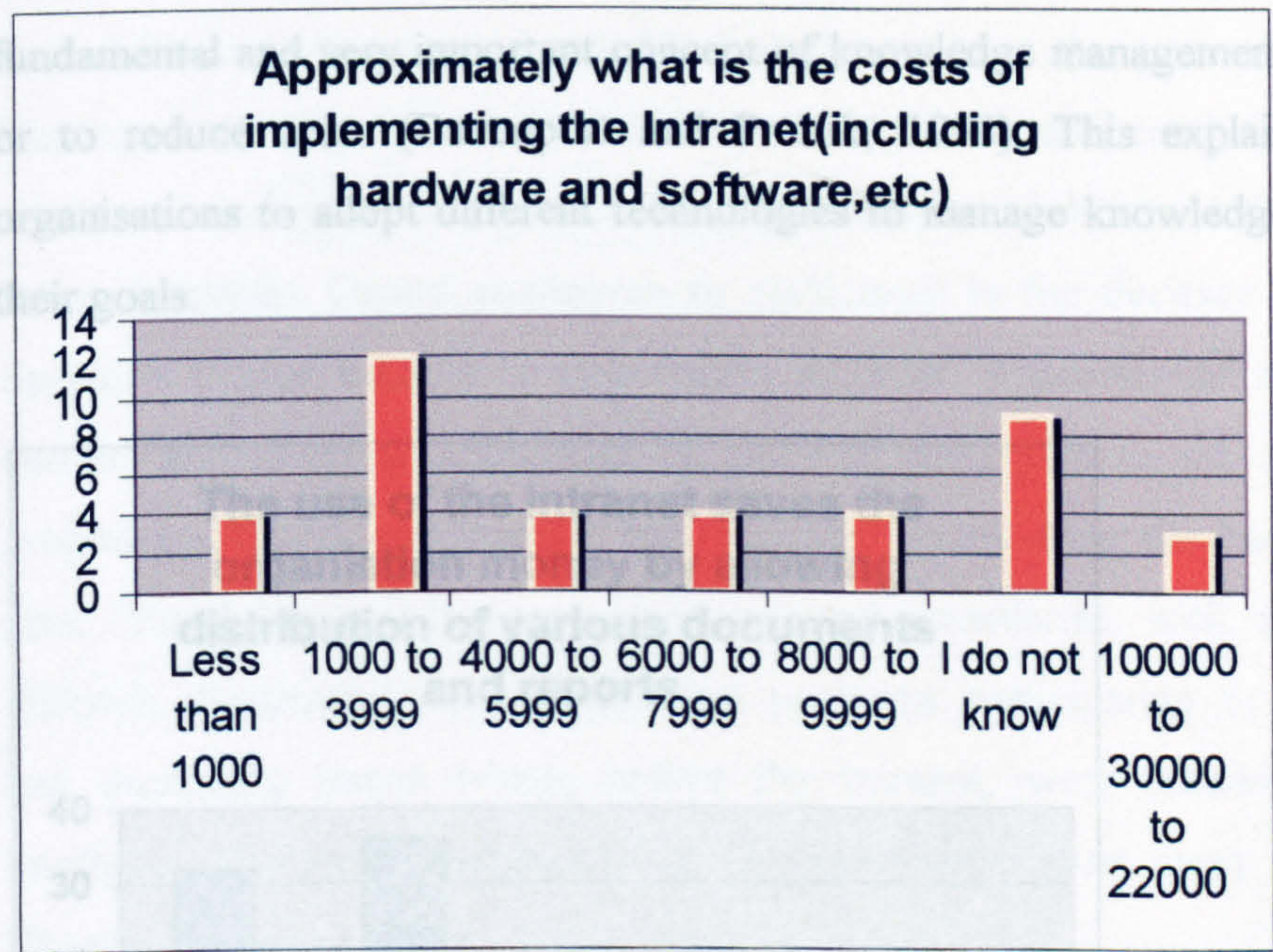


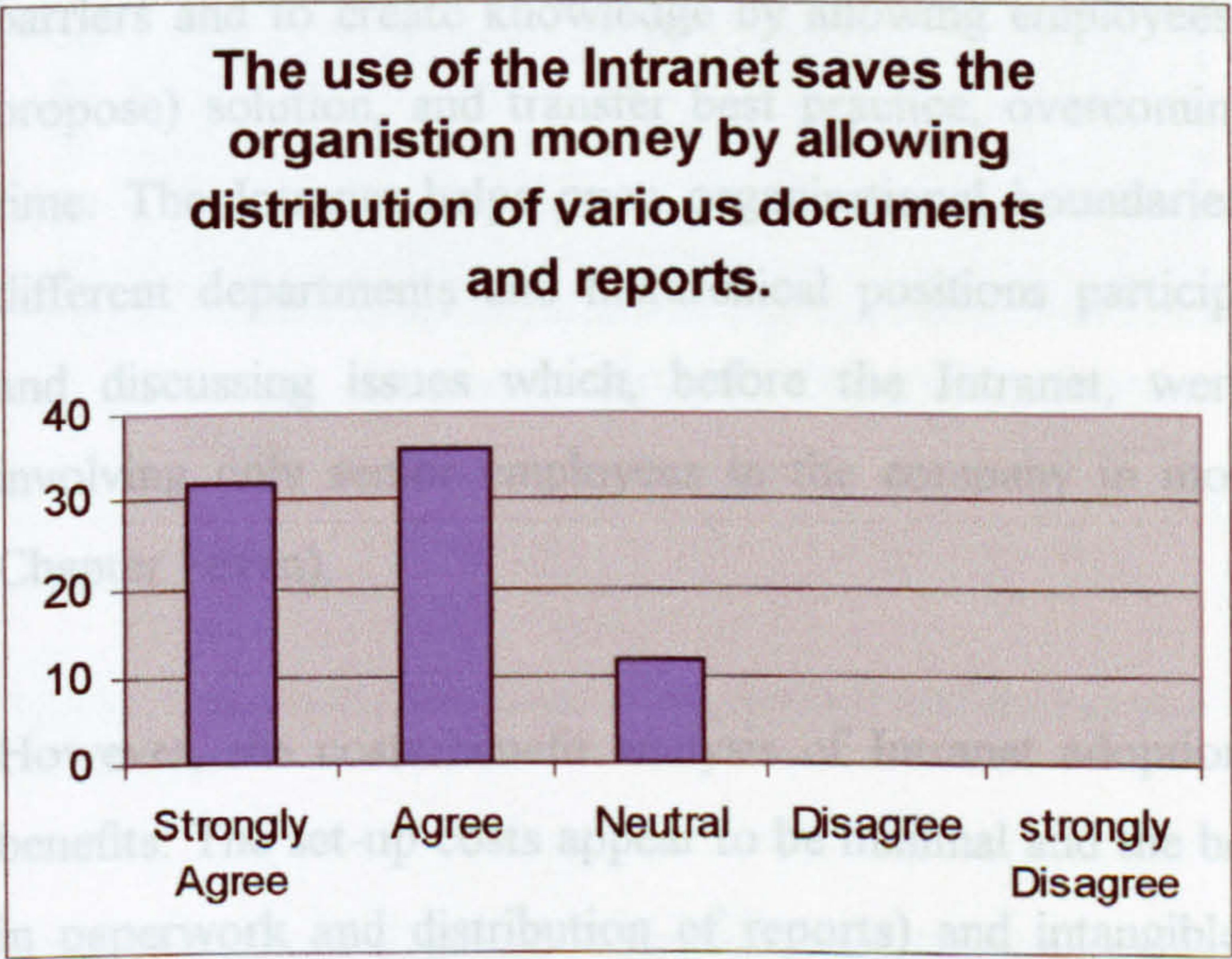
Figure 6. 5: Shows the Costs of the Intranet Adoption

6.4 Benefits of Intranet Implementation to Omani Companies

The majority of respondents, approximately 85%, agree or strongly agree that the use of the Intranet has saved their organisations money and only 15% of the respondents expressed neutral opinions. The information presented in Figure 6 showed that the neutral responses were most probably from organisations that adopted the Intranet less than a year ago and therefore, have had insufficient evidence on which to base a conclusion. Most organisations adopting the Intranet are motivated by the desire to reduce the cost of doing business to deal with the pressure of a highly competitive, global marketplace. There is evidence that the use of the Intranet can decrease the cost of producing, accessing and distributing information within a company and consequently effect a cost reduction. For instance Sun Microsystems has saved \$ 25 million a year on document distribution and cut transaction costs on automated cheque processing from \$35 to \$2 per cheque issued using the Intranet (Scott, 1998). The mini-case studies (see Chapter Four) report that one Omani private Sector Company has



reduced the costs by 80,000 Rial Omani one year after adopting the Intranet. The fundamental and very important concept of knowledge management is to increase profit or to reduce costs (Davenport and Prusak, 1998). This explains the eagerness of organisations to adopt different technologies to manage knowledge in order to achieve their goals.



**Figure 6.6: Shows Respondents' Agreement that the Intranet Saves Money**

The findings presented in Figure 6.7 reported that approximately 89% of the respondents agree or strongly agree that the use of the Intranet cuts time and effort spent on printing and distributing reports and documents. Figure 6.7 also shows that 11% of the respondents are neutrals. The conclusion is that the Intranet can cut down the time employees spend on routine communication tasks and answering routinely asked questions. This time can therefore be allocated to do other tasks in the organisation and consequently increase efficiency and productivity as reported by Drew (1999); Hills, (1998); Scott (1998) and Telleen (1996).

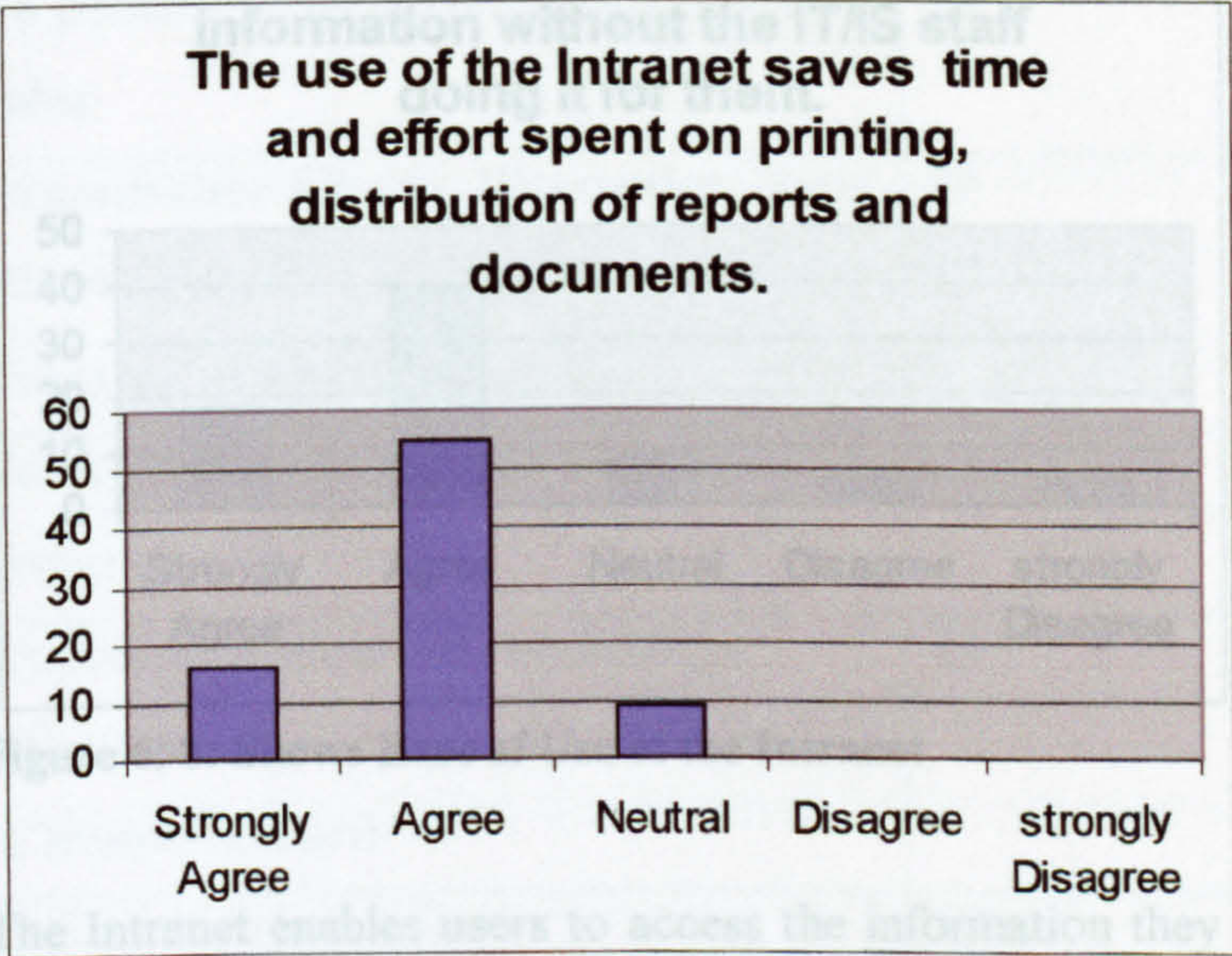


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In addition the value of information systems is sometimes not immediately apparent in financial terms, however, intangible benefits such as the promotion of organisational learning, enabling informed decision making and the catalysing of organisational change are of great importance to organisations (McBride, 1994). Furthermore, the Intranet enables Omani employees to participate in the decision making process. The Speakers Corner became an opportunity to break organisational and social hierarchical barriers and to create knowledge by allowing employees to ask questions, provide (or propose) solution, and transfer best practice, overcoming the barriers of distance and time. The Intranet helps open organisational boundaries, with many employees from different departments and hierarchical positions participating in the Speakers Corner and discussing issues which, before the Intranet, were limited to formal meetings involving only senior employees in the company in most cases (for more details see Chapter Seven).

However, the costs benefit analysis of Intranet adoption appears to acknowledge the benefits. The set-up costs appear to be minimal and the benefits both tangible (reduction in paperwork and distribution of reports) and intangible (such as improved customer services and faster and better access to up-to date information) are substantial according to Bernard (1998); Davenport and Prusak (1998); Gonzalez (1998) and Scott (1998).

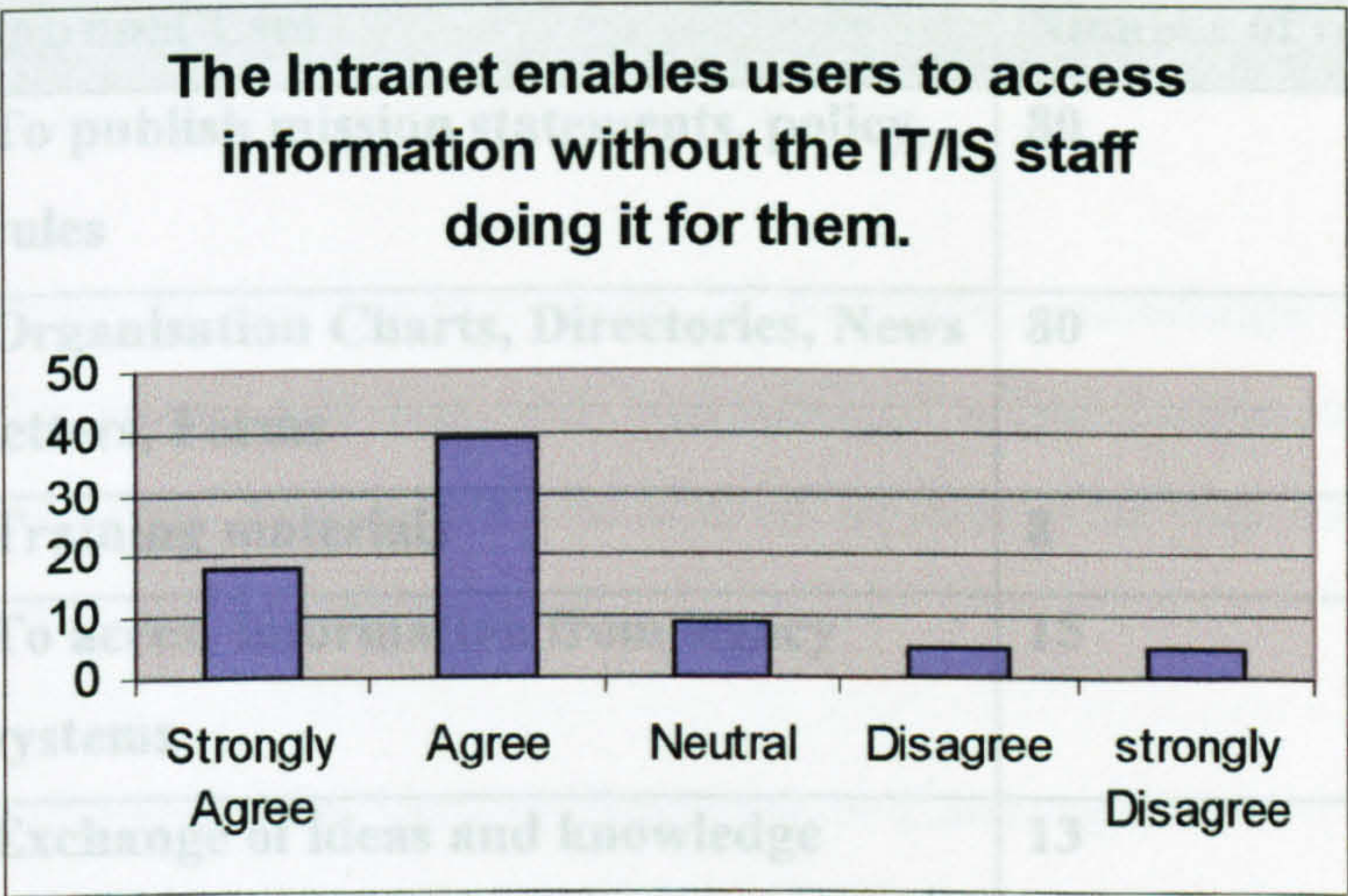




**Figure 6.7: shows the Respondents' Agreement that the Intranet Saves Time**

The result from Figure 6.8 showed that approximately 71% of respondents agree or strongly agree that the Intranet enables users to access, publish, and update information without the help of IT, IS staff. This means that the Intranet is seen as an intuitive and an easy technology to use. Only 29% of the respondents are neutral or disagree. The 29% neutral / disagree responses may be explained by the absence of the factors that influence the use of the Intranet within those organisations, for example lack of management support, lack of training and little or no user participation. These issues are discussed in detail in section three.





**Figure 6. 8: Shows Ease of Use of the Intranet**

The Intranet enables users to access the information they need without IT staff doing it for them. Accessing information when needed is an important aspect of knowledge management, which was more difficult for users with previous systems such as Mainframes.

*Table 6. 2: Shows Different Uses of the Intranet within the Omani Organisations*

**6.5 The Use of the Intranet within Omani Companies**

**6.5.1 Intention: Company Identity and Process**

Table 6.2 presents some uses of the Intranet, which relates to knowledge management activities within the Omani private sector organisations. It is clear from table 6.2 that Omani companies use the Intranet in ways that differ from one company to another.



Intranet Uses	Number of respondents
To publish mission statements, policy, rules	80
Organisation Charts, Directories, News letters, Forms	80
Training materials	8
To access information from legacy systems	15
Exchange of ideas and knowledge (Discussion Groups) and Dissemination of lessons learned	13
Personnel information	70
Customer information	8
Collaboration	2

**Table 6. 2: Shows Different Uses of the Intranet within the Omani Organisations**

**6.5.1 Intention: Company Identity and Process**

Table 6.2 shows that 100% of the Omani organisations use the Intranet to publish basic fundamental knowledge and information such as mission statements,, policies, rules and regulations. Knowledge of these activities means knowing the company's intention according to Nonaka (1994) which is the first and most important condition for knowledge creation and management. Awareness of this fundamental knowledge is necessary not only for the employees but also for customers. Consequently, it is possible for employees to judge the value of incoming messages (action, decision) and to interpret the message in reference to the organisation's mission statements rules, regulations, norms and culture. It is very important that everyone in the organisation is aware of the company's intention, in order to distinguish between what is correct and incorrect in context. Creating new knowledge is totally dependent on individuals' understanding of the organisation's intention and the interpretation of the incoming messages in accordance with or reference to this intention. It was seen that the Intranet was beneficial for the employees by enhancing



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their mental models of their organisations. In other words, it enables them to acquire a better understanding of their organisations.

Prior to the Intranet most of this basic knowledge was locked up in very thick documents and was only accessible to a few people in the organisation and in most cases the information was not up to date. This was more apparent in the case study reported in Chapter Seven.

### **6.5.2 Requisite Variety (Response to Challenge)**

From table 6.2 it is clear that 100% of the Omani organisations are using the Intranet to access organisation charts, directories, newsletters and forms. Accessing this information offers an opportunity for employees to find help and guidance. For example employees can rapidly establish the right person to go to for help or who can solve particular problems. This is what Nonaka (1994) called **Requisite Variety** the main purpose of which is to provide information to enable employees to respond to the challenge provided by the changing business environment. The use of the Intranet for such purposes helps employees to know what is happening in the organization and provides help in finding what is needed.

### **6.5.3 Training**

Surprisingly only 8 respondents (approximately 10%) indicated that the Intranet is used for training materials.

The idea of on-line training, at least from the theoretical perspective, is that it (online training) can be delivered with minimal human support. That is just provide the learning materials and allow trainees to self train. Intranet based training is the process by which some or all aspects of a training programme may be delivered to the employees throughout the organisation. The important characteristics about Intranet based training is that it is easily duplicable, distributable and updatable at anytime (Boisvert, 2000).



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Furthermore it also allows flexibility to trainees to progress at their own pace (Carry and Stancich, 2000).

Intranet based training not only delivers learning materials to learners, but can be extended to track everything from learning responses, to exams, and how many times a learner goes back to the same module (Boisvert, 2000).

Whilst training is essential for the workforce in modern organisations, it requires other factors, for example management support and training to transform employees from traditional learning methods of face to face training model to on-line training. There is a cultural issue and some cultures are predisposed to on-line training while others are not. In general it is the more bureaucratic that practitioners who operate by fixed rules, activities and information flows do not readily adapt. Another influencing factor is the lack of qualified technical staff within the Omani organisations who are able and capable of putting valuable training material in easily accessible forms for users. As stated by Mansell-Lewis (1997) the Intranet is only as good as the contents. This can explain the reason for the very low of the Intranet usage for the purpose of training.

Transformation from non-supportive to supportive cultures, requires additional factors, such as human and organisational issues, to be considered and incorporated in the introduction of the technology. The integration of these factors may enable Omani organisations to promote and utilise the Intranet in this very important domain.

According to researchers, the Intranet has many attributes to facilitate training and education, for instance it supports, animation, graphics, audio, video and chat features which are necessary to transfer knowledge and facilitate learning (Boisvert, 2000; Harvey et al., 1998; Scott, 1998).



**6.5.4 Access and Share Information from Legacy Systems (Cross Platform Compatibility)**

96% of the correspondents agree or strongly agree that the Intranet enables employees to access and share information and knowledge from and between heterogeneous (multi-vendor platform) systems. However, while 96% agree that the capability exists, Table 6.2 shows only 19% of the Omani organisations are using the Intranet for such purposes. The ability to access and share information between different people using different IT systems is very important and the core concept in knowledge management. Thus organisations have the flexibility to share information existing in different legacy database systems and consequently not abandon them due to incompatibility problems (Scott, 1998). Furthermore, cross-compatibility empowered organisations to adopt IT systems that suit their business requirements and at the same time give them a bargaining power to purchase from vendors that offer the best deals in terms of services and prices for the company (Kim, 1998). While the perceived capability of the technology is high (96%), the actual use is low (19%). This may be explained by the lack of management support and lack of qualified technical staff that are able to integrate different systems with the Intranet or due to other factors, which are discussed later.



6.5.7 Communication

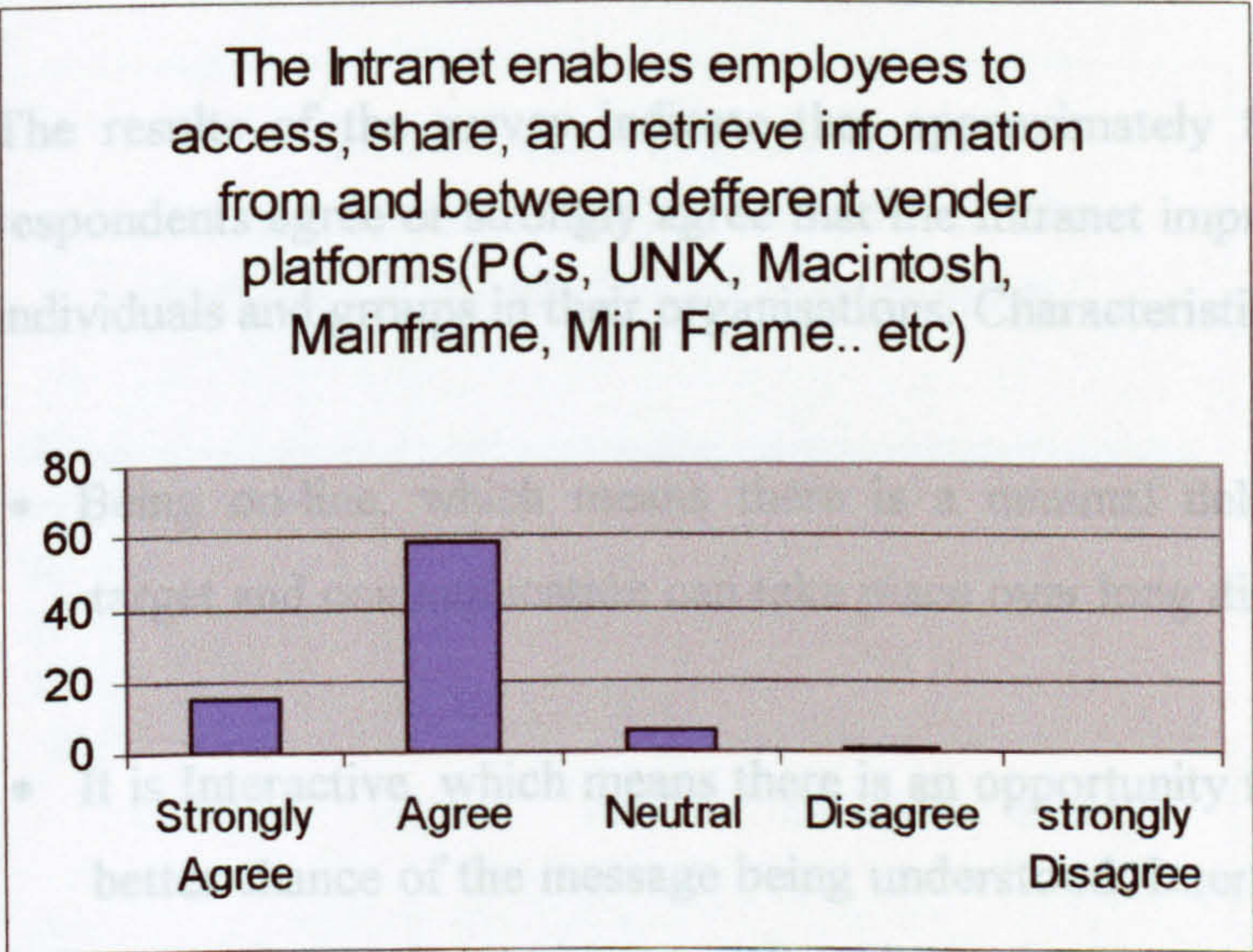


Figure 6.9: Shows the Perceived Capability of IT Integration through the Use of the Intranet

Furthermore, culture can play a role in some organisations where employees are not yet used to on-line access and publishing of information and prefer the old systems.

6.5.5 Dissemination of Lessons Learned (Knowledge Conversion)

Table 6.2 shows only 16% of the Omani companies use the Intranet to exchange ideas, knowledge and disseminate lessons learned, that is helping employees to be aware of what is going on in the company. Nonaka (1994) states that this concept offers redundancy in knowledge which plays a crucial role in knowledge development particularly in the Eastern culture. The benefits accrue when one individual or department is able to take advantage of the experience and understanding of another in the organisation. An organisation would have different entities of knowledge generated over the years by various groups and departments. These various and separate bodies of knowledge can be combined and shared over the Intranet and new knowledge can be born. Whilst this concept offers an overlap in knowledge between different departments, and groups from different locations that promotes cross-functional collaboration, accessing and of sharing information via the Intranet, it also cuts cost in paper, mailing and distribution (Scott, 1998).



### **6.5.7 Communication**

The results of the survey indicate that approximately 87% (see Figure 6.10) of the respondents agree or strongly agree that the Intranet improves communications between individuals and groups in their organisations. Characteristics of the Intranet such as:

- Being on-line, which means there is a minimal delay in messages reaching their target and communication can take place over long distances.
- It is Interactive, which means there is an opportunity to receive feedback, and have a better chance of the message being understood. Interactive communication provides a way in which messages can be tailored to meet individual users' or departments' needs.
- The use of 'pull' technology, which means that access is at the user's discretion. Information on the Intranet sits there waiting to be 'pulled'. This is ideal where you have large quantities of information to make available but not where the need is to be certain that a message has reached its target within a given timeframe. For that is an on-line, interactive medium, such as e-mail, can be used to 'push' targeted messages.

This finding is consistent with that of previous researchers (Harvey et al., 1998; Hill, 1998; Kim, 1998; Scott, 1998). For example Hill (1998) asserts that the Intranet has unique characteristics to improve which communication including speed, consistency of information, simultaneous communications and availability of communication at any time regardless of location and time zone.



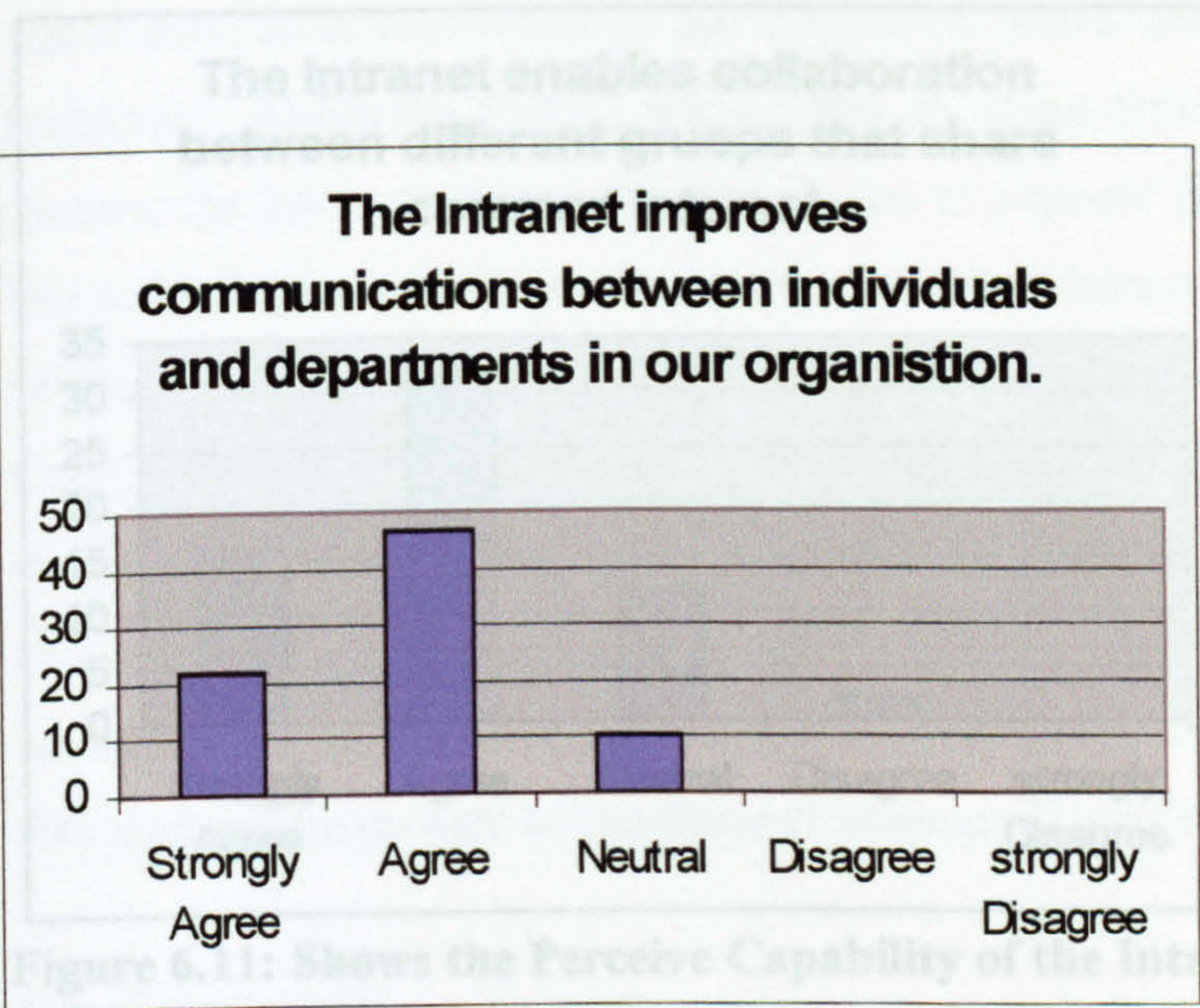


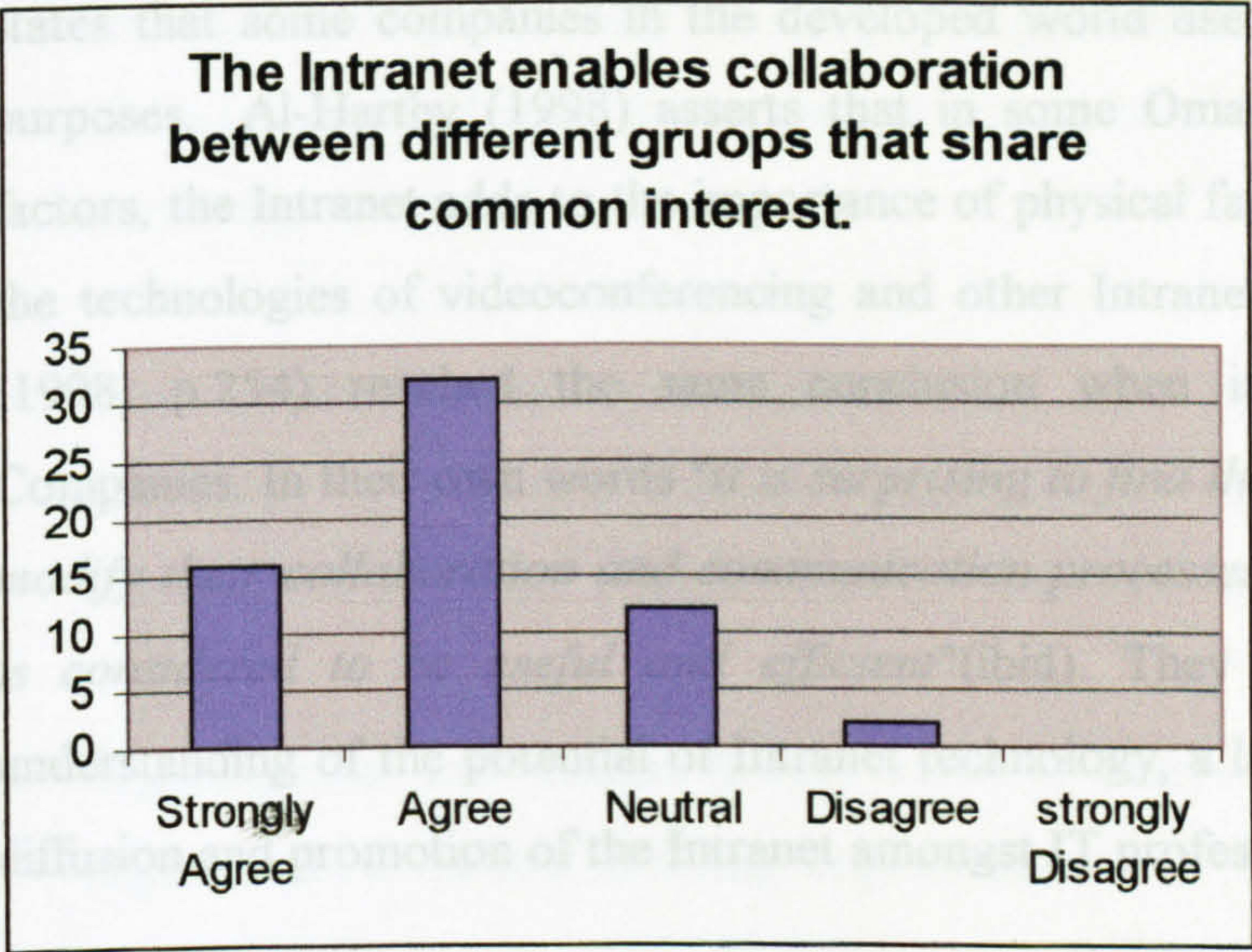
Figure 6.10: Shows the Participants Agreement that the Intranet Improves Communication in their Organisations

Figure 6.10: Shows the Participants Agreement that the Intranet Improves Communication in their Organisations

6.5.8 Collaboration on Projects

The survey shows that the majority (77%) of the respondents agree or strongly agree that the Intranet has the capability to enable collaboration between groups within or outside the organisation. Figure 6.11 indicates that 23% of the respondents are neutral or disagree.





**Figure 6.11: Shows the Perceive Capability of the Intranet to Support Collaboration**

Collaboration between individuals and team of employees is important and considered as an essential element in modern organisations. The Intranet presents a potential vehicle for enhancing collaboration between team members, departments and experts within the organisation or outside it by eliminating barriers of time and distance (Metes et al., 1998). The Intranet enables the transfer of tacit knowledge by connecting people with similar interests so that they can collaborate and share best practice (Davies, 2000). The Intranet enables on-line discussion groups, video conferencing and the capability of providing some degree of informality, feedback and spontaneity. Consequently the Intranet can support and facilitate remote collaboration, which is important to Omani organisations. While the majority of respondents support the idea that the Intranet is a vehicle to promote collaboration between different groups, departments and organisations, however, table 6.2 shows that only a few Omani companies (2%) are actually using the Intranet for this particular goal. When the participants were asked why not? The answers were that the Intranet is a recent phenomenon and the development of collaboration procedures take time, especially when dealing with other organisations. This reservation to the idea of the Intranet being used to support collaboration can be explained by the dominant culture that until recently was unused to the concept of carrying out projects electronically and from a distance. Scott (1998)



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states that some companies in the developed world use the Intranet for collaboration purposes. Al-Harthy (1998) asserts that in some Omani companies, due to cultural factors, the Intranet adds to the importance of physical face to face meetings rather than the technologies of videoconferencing and other Intranet facilities. Lai and Mahapatra (1998, p.254) reached the same conclusion when investigating the Hong Kong Companies. In their own words *"it is surprising to find that users do not use intranets to modify their collaboration and communication processes, even {when} this technology is considered to be useful and efficient"*(ibid). They attribute this to the lack of understanding of the potential of Intranet technology, a lack of training, and inadequate diffusion and promotion of the Intranet amongst IT professionals and users.

### 6.6 Comments

From the survey questionnaires, several comments have emerged:

- There has been recent adoption and penetration of the Intranet within Omani companies;
- The low costs of adoption and installation, ease of use, and pressure to reduce costs and increase profits are the main drivers for the Omani organisations' adoption of the Intranet;
- Some Omani companies are successful in utilising the Intranet for knowledge management activities such IT integration, training, collaboration, group discussions and knowledge sharing, while others are using the Intranet as simple internal Web Pages to distribute static information, such as News Letters and Employee Directories;
- There is a big gap between the participants' perception of the capability of the Intranet and the actual use, therefore, there is a considerable scope for improvement;



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- There is a lack (particularly from top management) of knowledge about the potential of the Intranet and what the Intranet can do to help their organisations in the area of knowledge management;
- Most of the Omani companies' technical staff lack the knowledge and skills necessary to optimise Intranet applications, especially when dealing with interconnection of legacy applications via the Intranet;
- Organisational and human factors make a difference in Intranet use from one organisation to another in Omani organisations.

These factors are discussed in great detail in the following sections.

## 6.7 Factors Influencing the Use of the Intranet

### 6.7.1 Reliability

Cronback's alpha has been used for determining the internal consistency of items within a scale for each construct as suggested by Bourque et al (1994); Crano (1973); Litwin (1995) and Nunnally (1978). Internal consistency *"describe the condition in which there is a high degree of interrelatedness among items"*. It measures *"the average interitem correlation of all items constituting a scale"* (Crano et al., 1973, p.231). Basically the reliability analysis determines the extent to which the items in the questionnaire are related to each other, and gives an overall index of the repeatability or internal consistency of the scale as a whole. Reliability is having similar answers from participants asked the same questions at different times or by different researchers. Litwin (1995), Frankfort-Nachmias et al (1996) and Nunnally (1978) suggest that an alpha value of 0.70 is sufficient to demonstrate a reasonable and acceptable level of internal consistency. Furthermore, Nunnally (1978) suggests that an alpha of 0.60 is



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sufficient for non-validated scales. A Statistical Package for Social Science, known as SPSS software is used to derive the statistical results.

The following Tables show the SPSS result of Cronback's alpha for each factor.

Management Support ***** Method 1 (space saver) will be used for this analysis *****		
- R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   ( A L P H A )		
1.	MAGSUP1	MS1
2.	MAGSUP2	MS2
3.	MAGSUP3	MS3
4.	MAGSUP4	MS4
Reliability Coefficients		
N of Cases =        80.0		N of Items =    4
Alpha =        .8747		
SPSS Output Shows		

Table 6.3: Shows the Result of Cronback's Alpha for Management Support Factor

IT Staff Training ***** Method 1 (space saver) will be used for this analysis *****		
R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   ( A L P H A )		
1.	ITST1	IT1
2.	ITST2	IT2
Reliability Coefficients		
N of Cases =        80.0		N of Items =    2
Alpha =        .8924		
SPSS Output		

Table 6.4: Shows the Result of Cronback's Alpha for IT Staff Training Factor



Availability of Fund***** Method 1 (space saver) will be used for this analysis *****		
- R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   ( A L P H A )		
1.	Availability of Fund1	RSA1
2.	Availability of Fund2	RSA2
Reliability Coefficients		
N of Cases =        80.0		N of Items =    2
Alpha =        .71		
SPSS Output		

Table 6.5: Shows the Result of Cronback's Alpha for Availability of Fund Factor

User participation ***** Method 1 (space saver) will be used for this analysis *****		
R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   ( A L P H A )		
1.	UPARTCP1	UP1
2.	UPARTCP2	UP2
Reliability Coefficients		
N of Cases =        80.0		N of Items =    2
Alpha =        .7381		
SPSS Output		

Table 6.6: Shows the Result of Cronback's Alpha for User Participation Factor



User Training ***** Method 1 (space saver) will be used for this analysis *****		
R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)		
1.	USTRANG1	UT1
2.	USTRANG2	UT2
Reliability Coefficients		
N of Cases =        80.0		N of Items =    2
Alpha =        .7200		
SPSS Output		

Table 6.7: Shows the Result of Cronback's Alpha for User Training Factor

IT Structure ***** Method 1 (space saver) will be used for this analysis *****		
R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)		
1.	Ist& maint Intrnt Hardware	IMIH
2.	Ist& maint Intrnt Software	IMIS
3.	Makng Decision Red Intrnt App	MDIA
4.	Devlpng Intrnt App	DEIA
Reliability Coefficients		
N of Cases =        80.0		N of Items =    4
Alpha =        .69		
SPSS Output Shows		

Table 6.8: Shows the Result of Cronback's Alpha for IT/IS Structure Factor

Tables (6.3 to 6.8) report the reliabilities for the measurements. The reliability ranges from 0.89 to 0.69, providing above the minimum requirement of 60% as suggested by Litwin (1995)and Nunnaly (1978).



### 6.7.2 Data Analysis

One of the aims of the research is to identify factors that influence the use of the Intranet in knowledge management within the Omani companies. In other words what factors make one organisation's use of the Intranet high, while another's is low, according to the Gartner Group (1995) classification. To find a relationship between the independent variables and the dependent variable, the Spearman Correlation technique to measure the degree of correlation between two rank order variables was adopted as suggested by several statisticians (Gibbons, 1993; Kinnear et al.; 1999; Oppenheim, 1992). Siegel et al.,(1988, p.235) assert that *"of all the statistics based on ranks, the Spearman rank-order correlation coefficient was the earliest to be developed and is perhaps the best known today"*. The Spearman rank correlation is often used to describe the relationship between two ordinal variables. The Spearman Correlation coefficients range in value from -1 (a perfect negative relationship) to +1 (a perfect positive relationship). A value of 0 indicates no relationship (Fink, 1995). A correlation coefficient is a numerical summary which measures the degree of correlation between two variables.

Factors with  $>0.4$  correlation coefficient and at 0.05 significance level ( $\alpha$ ) or lower (better) are only considered in this work. When a significance level is chosen before the test, it is called alpha ( $\alpha$ ). Statisticians considered factors that have 0.4 or less correlation coefficient as a low correlation (Cohen and Holliday, 1982).

According to Fielding and Gilbert (2000) and Martin and Firth (1983) significance level means that there is always some possibility that an apparent correlation coefficient could have arisen by fluctuations in the random sampling. In other words the chance of saying a correlation exists when it actually does not (Hair et al., 1998). Therefore, statisticians suggest it is important for the researcher to decide how low the probability is ( $\alpha$  value). Most statisticians use a significance level of 5% as the criterion (Fielding and Gilbert, 2000; Fink, 1995; Cohen and Holliday, 1982; Martin and Firth, 1983). However, values as low as 1% or 0.1% might be needed if the consequences of the test could be very costly or crucial, especially in medicine (Fielding and Gilbert, 2000;



Martin and Firth, 1983). Table 6.9 developed by Cohen and Holliday (1982) shows the meaning of different values of the correlation coefficient.

Correlation	Meaning
0.00 to 0.19	A very low correlation
0.20 to 0.39	A low correlation
0.40 to 0.69	A modest correlation
0.70 to 0.80	A high correlation
0.90 to 1.00	A very high correlation

Table 6.9: shows the meaning of different correlation coefficient developed by Cohen and Holliday (1982, p.93).

**6.7.2.1 Top Management Support**

Table 6.10 shows the result of Spearman correlation analysis. The table shows a strong positive relationship between the independent variable, Top Management Support, and the dependent variable, the (Low, Medium or High) use of the Intranet. The correlation coefficient is .78 and the P value =0.001. The P value (also called the observed or obtained value) is the probability of obtaining the result of a statistical test by chance (Fink, 1995) If the P value is less than the alpha the null hypothesis is rejected (Ibid). From table 6.10 it can be seen that  $p < \alpha$ , the finding is statistically significant and met the criteria set in section 3.2, therefore H1 is accepted.

This result suggests that those Omani organisations that have high top management support consequently have high level of the Intranet usage and the reverse is true. Management support appears to be essential in the use of the Intranet within Omani companies and this may be due to the culture of the Omani business environment that depends on the personal relationships rather than on the system. In other words the support depends on the relationship between the IT director and top management. If an IT director can get on well with top management, he will receive their support even at the expense of the organisation's benefits.



Correlations

			The Use of the Intranet	MS
Spearman's rho	Correlation Coefficient	The Use of the Intranet	1.000	.768**
		MS	.768**	1.000
	Sig. (1-tailed)	The Use of the Intranet	.	.000
		MS	.000	.
N		The Use of the Intranet	80	80
		MS	80	80

\*\* . Correlation is significant at the .01 level (1-tailed).

Table 6.10: Shows the Spearman Correlation between Management Support Factor and the Level of Intranet Usage.

This finding is consistent with most of the previous literature dealing with the relationship between management support and information systems implementation success. For example, Abdul-Gader (1990), Igbaria et al (1997), Doherty et al (1998) and Powell and Dent-Micallef (1997) found a positive relationship between management support and the use and the success of Information Technology. Similarly, Eder (1998) found a positive relationship between top management support and the diffusion and infusion of the Intranet. Moreover, Scott (1998) argues that top management support for Intranet implementation is required for several reasons:

- Top management can allocate funds to buy the necessary tools required for the implementation and maintenance of the Intranet;
- Top management can hire and retain technical expertise by training and reskilling employees;
- Top management can encourage and create the atmosphere for an organisational culture that explores and adopts the Intranet technology minimising resistance to change by means of incentives and reward systems;



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- Top management can facilitate knowledge management using the Intranet by promoting autonomy, intention, redundancy, fluctuation and creative chaos, and requisite variety.

Consequently any implementation of the Intranet should not be started without the approval and full support of top management.

### **6.7.2.2 IT Staff Training**

From table 6.11, the result of the Speraman correlation analysis shows a strong positive relationship between the IT Staff Training factor and the level of Intranet usage within Omani organisations. The table below shows a correlation coefficient of 0.83 between the independent variable (IT Staff Training) and the dependent variable the (Low, Medium or High) use of the Intranet. The correlation is statistically significant at  $P=0.001$ . Consequently  $p < \alpha$ , therefore hypothesis (H3) is accepted.

The finding suggests the more IT Staff Training is provided the higher high level of Intranet usage within the Omani organisations and vice versa. This means that only those companies that trained IT staff and consequently have competent IT professionals in this area were able to develop and integrate their Intranet with other systems and thus reach a high level of Intranet usage. The contrary is true for those companies with little or no IT staff training.



Correlations

			The Use of the Intranet	ITST
Spearman's rho	Correlation Coefficient	The Use of the Intranet	1.000	.830**
		ITST	.830**	1.000
	Sig. (1-tailed)	The Use of the Intranet	.	.000
		ITST	.000	.
	N	The Use of the Intranet	80	80
		ITST	80	80

\*\* . Correlation is significant at the .01 level (1-tailed).

Table 6.11: Shows the Spearman Correlation between IT Staff Training Factor and the Level of Intranet Usage.

This finding is consistent with previous researchers (Al-Abdul-Gader and Alangari, 1994; Jayasuriya, 1993; Kirlidog, 1996; Scott, 1998). In particular Al-Abdul-Gader and Alangari (1994) found a very strong linkage between IT Staff Training and the use and success of information systems in the developing countries. The challenge facing Omani organisations is coping with increasing salary levels and competitive recruitment of highly qualified technical people. Therefore to minimise the impact of this challenge, it is essential that Omani organisations train and develop technical staff to enable them to provide a better service to users and develop applications that meet their business needs. This should lead high levels of Intranet usage. The commercial press suggests that the Intranet is an easy technology to use but to develop sound applications that give the company competitive advantages IT staff development and training are required. According to Tang (2000, p.158-159) that “....to sum up, all of these problems in the process of adoption, including planning, establishment, management, and maintenance, need a great deal of information and a large amount of experts who are experienced in Intranet adoption”.

Scott (1998) argues that training is essential for IT staff to:

- Keep them aligned with the changes in current business needs;



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- Learn new technical skills to cope with maintenance problems;
- Manage the huge volume of information and large number of disorganised electronic documents posted by many parts of an organisation;
- Manage and maintain decaying links;
- Provide technical assistance to employees to take advantage of advanced features such as interactive forms and script that can be integrated with other applications;
- Manage information flow;
- Speed up the Intranet development and to channel it in the direction most beneficial according to the goals and the objectives set by a company.

### 6.7.2.3 Availability of funds

Availability of funding is a very important issue facing organisations in the developing countries. These organisations lack the funding, to develop sound and easy-to-use applications, to undertake the modifications and enhancements needed when requirements are changed. Table 6.12 shows that availability of funding has a strong positive relationship of 0.69 with the level of the Intranet usage. The result is statistically significant and met the criteria set in section 3.2, therefore H5 is accepted.

#### Correlations

			The Use of the Intranet	RSA
Spearman's rho	Correlation Coefficient	The Use of the Intranet	1.000	.653**
		RSA	.653**	1.000
	Sig. (1-tailed)	The Use of the Intranet	.	.000
		RSA	.000	.
N		The Use of the Intranet	80	80
		RSA	80	80

\*\* . Correlation is significant at the .01 level (1-tailed).

**Table 6.12: Shows the Spearman correlation between Availability of Funds Factor and the Level of Intranet Usage.**



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Funds are needed also to develop IT skills to tailor the applications meet specific business needs. Moreover, the fund is needed to purchase hardware and software, which are in a constant flux. The lack of funding can cause the following:

- Delays, in routine maintenance, enhancements in the systems and the development of newly needed systems (Remenyi, 1996);
- Insufficient help and services to users, resulting in a high rate of user error (Remenyi, 1996).

Kirlidog (1996) has reported that a lack of funding is a major problem in developing and maintaining effective information systems in the less developed countries.

Furthermore, lack of sufficient funding can cause a project to stop in the middle which consequently results in not only a waste of time, money and effort, but the diminution of competitive advantages generated from the IT system.

**6.7.2.4 User Participation**

User participation in the development of the Intranet applications appears to have a significant impact on the use of the Intranet. Table 6.13 shows that user participation

Correlations			The Use of the Intranet	UP
Spearman's rho	Correlation Coefficient	The Use of the Intranet UP	1.000	.721**
			.721**	1.000
	Sig. (1-tailed)	The Use of the Intranet UP	.	.000
			.000	.
N		The Use of the Intranet	80	80
		UP	80	80

\*\* . Correlation is significant at the .01 level (1-tailed).

**Table 6.13: Shows the Spearman Correlation between User Participation Factor and the Level of Intranet Usage.**



has a strong positive relationship of 0.72 with the level of Intranet usage.

The result is statistically significant at  $p < 0.001$ , therefore, H4 is accepted. User participation in the Intranet applications development is a great opportunity to close the gap between IT professionals who know little about business needs and the users who know little about information technology. According to Lockett (1998) the success of information systems depends on bridging the gap between business professionals and IT professionals. This result is consistent with previous findings. In particular Gonzalez, (1998) states that to avoid implementing an Intranet for knowledge management which no one will use, it is essential to involve the users in the technology design, development and implementation.

The advantages of user participation in the development of the Intranet can be summarised as follows:

- Reduce uncertainty and minimise confusion about the expectation from a given Intranet development activity (Gonzalez, 1998; Poulymenakou and Holmes, 1996);
- User participation is an opportunity for an ongoing feedback loop to provide information for the IT professionals which can be used immediately or at sometime in the future. Proactive dialogs facilitate the conditions for the acceptance of new technologies (Gonzalez, 1998).

### **6.7.2.5 User Training**

User training has a positive relationship with the use of the Intranet. Table 6.14 shows that  $p < 0.05$ , however, the correlation coefficient (0.24) is not strong.



Correlations

			The Use of the Intranet	UT
Spearman's rho	Correlation Coefficient	The Use of the Intranet	1.000	.243*
		UT	.243*	1.000
	Sig. (1-tailed)	The Use of the Intranet	.	.015
		UT	.015	.
	N	The Use of the Intranet	80	80
		UT	80	80

\*. Correlation is significant at the .05 level (1-tailed).

Table 6.14: Shows the Spearman Correlation between User Training Factor and the Level of Intranet Usage.

This suggests that the Intranet is an easy to use technology and consequently does not require much training. Two important points need to be considered in explaining this finding:

- The Intranet user needs only a little assistance because of the point and click nature of the hyperlinks used to search for information, view documents and post to discussion groups (Chapter Seven);
- The awareness and the usage of the Internet (which started long before the adoption of the Intranet) means that even inexperienced users of the Intranet would be familiar with the basic requirements of how to access and share information (Chapter Seven).

Previous literature suggests that the Intranet is an intuitive and easy-to-use technology (Bernard, 1998; Davenport and Prusak, 1998; Kim, 1998; Hill, 1998; Scott, 1998).



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However this finding may not be generalised to other information systems or even advanced features of the Intranet.

**6.7.2.6 Security of the Intranet**

Surprisingly the security of the Intranet has no significant impact on the level of Intranet usage. Table 6.15 shows that security has a positive correlation with the level of the Intranet usage, however, this correlation is not statistically significant with  $p>0.05$ .

Contrary to what was hypothesised, the perceived security has failed to meet the criteria set in section 3.2, Therefore, H 7 is rejected.

Correlations			The Use of the Intranet	SCR
Spearman's rho	Correlation Coefficient	The Use of the Intranet	1.000	.098
		SCR	.098	1.000
	Sig. (1-tailed)	The Use of the Intranet	.	.194
		SCR	.194	.
	N	The Use of the Intranet	80	80
		SCR	80	80

**Table 6.15: Shows the Spearman Correlation between Security of the Intranet Factor and the Level of Intranet Usage.**

The finding may mean that the Intranet, in the participants' views, has adequate security due to firewalls and consequently there is no worry about this issue.

This result is in line with previous researchers who state that the Intranet has adequate security (Blackwell, 1998; Gonzalez, Olin et al, 1999; 1998; Went, 1998).



### 6.7.2.7 IT Structure

IT structure appears to have a very weak correlation coefficient (.059) with the Intranet usage level. Table 6.16 shows that the result is not statistically significant  $p > 0.05$ , therefore H6 is rejected. This means that whether the IT structure is centralised, decentralised, or "hybrid" has no significant effect on the level of Intranet usage. This is consistent with Eder's (1998) work, which found no relationship between IT structure and Intranet infusion and diffusion. However, Ein-Dor and Segeve (1982) and Zmud et al (1986) found a link between "hybrid" structure and the success of IT implementation.

It was expected that the hybrid structure, when IT departments and user departments share control of the Intranet development, would have a higher level of Intranet usage. This was not the case. The survey shows that the IT departments in Omani Organisations retain the main responsibility for Intranet hardware and software, whereas only a few user departments in Omani Organisations are responsible for maintaining the Intranet contents. However, there is no difference in terms of Intranet usage level between them. This may be due to the Intranet being a new technology in which user departments in the developing countries lack qualified skills, therefore, they are still heavily reliant on IT departments. The work of Ein-Dor and Segeve (1982) and Zmud (1986) concerns IT systems in general whilst the present research and that of Eder (1998) deal specifically with Intranet implementation, therefore, being context specific. However, this finding contradicts Bernard (1998) and Gonzalez (1998) who found that in most American Companies, end users carry the main responsibility for building their own Intranet applications. This case may be true for the developed economies where users are more sophisticated and have a longer history of using information technology but this is not the case in the developing countries.



Correlations

			The Use of the Intranet	IT Structure
Spearman's rho	Correlation Coefficient	The Use of the Intranet	1.000	.059
		IT Structure	.059	1.000
	Sig. (1-tailed)	The Use of the Intranet	.	.302
		IT Structure	.302	.
	N	The Use of the Intranet	80	80
		IT Structure	80	80

Table 6.16: Shows the Spearman Correlation between IT Structure Factor and the Level of Intranet Usage.

6. 8 Summary of the Correlation Analysis

The central question addressed in the correlation analysis concerns the examination of factors influencing the use of the Intranet within Omani companies. Tables 6.10 to 6.16 show that five factors out of seven have a strong positive correlation with the use of the Intranet at significant level of 0.05 or lower. Management Support, IT Staff Training, Availability of Funds and User Participation appear to have strong positive relationships with the level of Intranet usage and satisfy the criteria (coefficient>0. 4 and  $\alpha \leq 0. 05$ ) set in section 3.5. Whilst user training has a very low correlation coefficient (0.24) and satisfied only one criteria ( $p < 0. 05$ ).

Intranet security and IT structure appear to have a very low correlation with the Intranet usage level and failed to satisfy any of the criteria set, therefore, it is excluded from further analysis.



## 6.9 Regression Analysis

From the correlation analysis the conclusion is that most of the factors are correlated to the Intranet usage level discussed in this research. However, correlation does not have the ability to explain how much of the level of the Intranet usage is explained by the factors investigated in this research (Fielding and Gilbert, 2000). In order to address this question, regression analysis technique was carried out. " *Regression analysis is a general statistical technique used to analyse the relationship between a single dependent variable and several independent variables*" (Hair et al., 1998, p.142).

The results of regression analysis are generally used for two purposes:

- To understand the direction and the strength of an independent variable's effect on the dependent variable (Fielding and Gilbert, 2000; Hair et al., 1998; Neter et al., 1989; Sharma, 1996; Tabachnic and Fidell, 1996). This means the ability to explain a dependency of one variable on the other;
- To make future predictions of the dependent variable with the set of independent variables (Fielding and Gilbert, 2000; Hair et al., 1998; Sharma, 1996; Tabachnic and Fidell, 1996).

Basically regression analysis technique is used when the researcher wants to determine what variables contribute to the explanation of the dependent variable and to what degree.

According to Hair et al (1998, p.141) regression analysis is by "*far the most widely used and versatile dependence technique, applicable in every facet of business decision making*".

Although there are several types of regression analysis e.g simple regression, multiple regression and logistic regression, the latter is the one that best suits to the needs of this research.



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Logistic regression is a special kind of regression that is formulated to predict and explain a categorical data rather than a metric data (Hair et al., 1998; Sharma, 1996; Tabachnic and Fidell, 1996). Metric data is quantitative data (for example an interval or ratio) in contrast nonmetric data is *"qualitative data, these are attributes, characteristics, or categorical properties that identify or describe a subject or object but not the amount. Also called nominal or ordinal data"*(Hair et al., 1998, p.2).

Logistic Regression is more appropriate for this research for the following reasons:

- Logistic regression analysis does not rely on strictly meeting the assumptions of multivariate normality and equal variance-covariance matrices across group assumption that are not met in many situations (Hair et al., 1998; Sharma, 1996; Tabachnic and Fidell, 1996). Hair et al (1998, p.276) observed that *"Logistic regression does not face these strict assumptions and is much more robust when these assumptions are not met, making its applications appropriate in many more situations. Second, even if the assumptions are met, many researchers prefer logistic regression because it is similar to regression"*.
- Logistic regression is more appropriate for ordinal and nominal data and it can handle categorical independent variables easily (Hair et al., 1998; Hosmer and Lemeshow, 1989; Sharma, 1996). This is ideally suited to the research data.

### 6.9.1 Stepwise Estimation Technique

This technique is based on selecting the best predictor (independent variable), which has the highest correlation (Hair et al., 1998; Sharma, 1996) followed by the next independent variable, which contributes, to the explanatory power that can be added to the regression model. Other independent variables can be added as long as their partial correlation coefficients are statistically significant (Hair et al., 1998; Sharma, 1996).



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Factors that have met the criteria set in section (3.5) were included in the logistic regression model. Four potential factors were identified (**Management Support, IT Staff Training, Availability of Funds, and User Participation**) as strong candidates for inclusion and have met the criterion set for this research (correlation coefficient  $>0.4$  and  $P \leq 0.05$ ) as suggested by statisticians (Fink, 1995; Cohen and Holliday, 1982; Martin and Firth, 1983).

### 6.9.2 Criteria for Selecting the First Variable

The criterion for selecting the first independent variable to be included in the logistic regression model is based on the coefficients because the higher the correlation coefficient, the stronger the relationship and hence the greater the explanatory and predictive accuracy (Hair et al., 1998; Sharma, 1996). Looking at table 6.11, IT Staff Training factor has the highest correlation with the dependent variable and it is thus the first to be included in the Logistic Regression.

### 6.9.3 Assessing the Overall Model Fit

Several measures are used to assess the overall model fit. This research concentrates on the most important of these measures, namely, the -2LL, the Cox and Snell and Nagelkerke as suggested by Hair et al (1998) although Sharma (1996) uses only one measure, the -2LL, to derive his result. This research strategy utilises the above three measures suggested by Hair et al (1998) to make the findings more robust and credible. The Cox and Snell  $r^2$  and Nagelkerke  $r^2$  are a statistical measure used to determine the variation of Intranet usage attributed to the entered factor in the regression analysis. Each factor is entered in the SPSS software to derive the variation result.

According to Hair et al (1998) Logistic Regression maximises the "likelihood" that an event will occur and the overall measure of how the model fits is given by the likelihood value. It is actually **-2 times the log of the likelihood value** and is referred to as **-2LL or -2 log likelihood**. A well fitting model will have a small value for -2LL.



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According to Hair et al (1998) a perfect model will have Nagelkerke  $r^2 = 1$  and  $-2LL=0$

### 6.9.4 Setting a Baseline

It was suggested by Hair et al., (1998) that a baseline should be set before estimating the first regression equation. The baseline is used to compare the predictive ability of the regression model. *"The baseline should represent our best prediction without the use of any variable"*(Hair et al., 1998, p.150). The mean is used to set the base model and to calculate the likelihood value log (-2LL) as suggested by Hair et al., (1998).

The -2LL value is 77.971125 (given by the software as a base) prior to the inclusion of the **IT Staff Training Factor** (see Table 6.17 for the log likelihood).

### 6.9.5 IT Staff Training

When **IT Staff Training** is included in the single variable model (see table 6.17), the -2LL value is reduced from the base model value of 77.971125 to 54.929, a decrease of 23.04213. The smaller the -2LL value, the better is the model fit (Hair, et al., 1998; Sharma, 1996).

- The Cox and Snell  $r^2$  , with higher values indicating greater model fit, (however, this model) has the limitation that it can not reach the maximum value of 1, therefore, Nagelkerke  $r^2$  proposed a modification that had the range of 0 to 1 (Hair et al., 1998). Table 16 shows the Cox and Snell value is  $r^2$  0.310 and the Nagelkerke value is  $r^2$  0.434.

The result of the regression analysis shows that the decrease in the value of -2LL from 77.971125 to 54.929, a decrease of 23.04213 per cent of the variation in the level of the Intranet usage, is explained by the **IT Staff Training** factor. The Cox and Snell and Nagelkerke values of  $r^2$  0.310 and 0.434 respectively show the amount by which the variation of Intranet usage level (e.g Low and High) is explained by **IT Staff Training Factor**.



Approximately forty three per cent of the variation in the Intranet usage level (**Low and High**) within Omani companies is explained by the IT Staff Training factor alone according to Nagelkerke's measure.

Logistic Regression			
Dependent Variable..	VAR00007	The Use of the Intranet	
Beginning Block Number	0.	Initial Log Likelihood Function	
-2 Log Likelihood	77.971125		
* Constant is included in the model.			
Beginning Block Number	1.	Method: Enter	
Variable(s) Entered on Step Number			
1..	IT Staff Training	ITST	
-2 Log Likelihood	54.929		
Cox & Snell - R <sup>2</sup>	.310		
Nagelkerke - R <sup>2</sup>	.434		
	Chi-Square	df	Significance
Model	23.042	1	.0000
Block	23.042	1	.0000
Step	23.042	1	.0000

**Table 6.17: Shows the Result of Step One: The Entry of IT Staff Training Factor in Stepwise Logistic Regression**



6.9.6 Management Support

The entry of the second independent variable to logistic regression leads to the following results.

- All of the measures of model fit are improved considerably. (see Table 6.18)

Logistic Regression			
Dependent Variable.. VAR00007 The Use of the Intranet			
Beginning Block Number 0. Initial Log Likelihood Function			
-2 Log Likelihood 77.971125			
* Constant is included in the model.			
Beginning Block Number 1. Method: Enter			
Variable(s) Entered on Step Number			
1..	IT Staff Training	ITST	
	Management Support	MS	
-2 Log Likelihood 41.180			
Cox & Snell - R^2 .448			
Nagelkerke - R^2 .625			
	Chi-Square	df	Significance
Model	36.791	2	.0000
Block	36.791	2	.0000
Step	36.791	2	.0000

Table 6.18: Shows the Result of Step Two: The Entry of the Management Support Factor in Stepwise Logistic Regression



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- The -2LL value decreased from 54.929 to 41.180. A smaller value of the -2LL measure indicates an improved model fit.
- The Cox and Snell  $r^2$  and Nagelkerke  $r^2$  measures have increased, respectively from  $r^2$  0.310 to 0.434 and  $r^2$  0.448 to 0.625 also indicating a better model fit.

Table 6.18 shows the result of the regression analysis when **IT Staff Training** and **Management Support** were included in the model. The decrease of 23.04213 per cent in the -2LL and the increase of 0.124 and 0.177 per cent of the Cox and Snell  $r^2$  and Nagelkerke  $r^2$  respectively in the variation of the level of the Intranet usage is explained by **IT Staff Training** and **Management Support** factors.

The inclusion of management support contributed approximately 18% to the variation of the Intranet usage level.

### 6.9.7 Availability of Funds

The inclusion of the third independent variable (**Availability of Funds**) in the regression model causes, all of the measures of model fit to be improved. Table 6.19 shows:

- The -2LL value decreased from 41.180 to 30.271. A smaller value of the -2LL measure indicates a better model fit than the two variables.
- The Cox and Snell  $r^2$  and Nagelkerke  $r^2$  measure have increased, respectively from  $r^2$  0.445 to  $r^2$  0.537 and  $r^2$  0.625 to  $r^2$  0.750 also indicating a better model fit.

This means the inclusion of the **Availability of Funds Factor** in the regression analysis increases the explanation and prediction by approximately 13 percent (0.75- 0.625).



## Logistic Regression

Dependent Variable.. VAR00007 The Use of the Intranet  
Beginning Block Number 0. Initial Log Likelihood Function  
-2 Log Likelihood 77.971125  
\* Constant is included in the model.

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number  
1.. IT Staff Training ITST  
Management Support MS  
Availability of Fund RSA

-2 Log Likelihood 30.271

Cox & Snell - R<sup>2</sup> .537  
Nagelkerke - R<sup>2</sup> .750

	Chi-Square	df	Significance
Model	47.700	3	.0000
Block	47.700	3	.0000
Step	47.700	3	.0000

**Table 6.19: Shows the Result of Step Three: The Entry of Availability of Funds Factor in Stepwise Logistic Regression**

### 6.9.8 User Participation

The entry of User Participation factor to the regression model has caused all of the measures of model fit to be improved. Table 6.20 shows that:

- The -2LL value decreased 30.271 to 15.531. A smaller value of the -2LL measure indicates an improved model fit.



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- The Cox and Snell  $r^2$  and Nagelkerke  $r^2$  measure have increased, respectively from  $r^2$  0.537 to  $r^2$  0.635 and  $r^2$  0.750 to  $r^2$  0.887 indicating a better model fit.

### Logistic Regression

```
Dependent Variable..  VAR00007    The Use of the Intranet
Beginning Block Number  0.    Initial Log Likelihood Function
-2 Log Likelihood      77.971125
* Constant is included in the model.

Beginning Block Number  1.    Method: Enter

Variable(s) Entered on Step Number
1..      IT Staff Training      ITST
          Management Support    MS
          Availability of Fund   RSA
          User Participation     UP

-2 Log Likelihood      15.531
Goodness of Fit        46.823
Cox & Snell - R^2      .635
Nagelkerke - R^2       .887

                Chi-Square      df Significance

Model            62.440         4          .0000
Block            62.440         4          .0000
Step             62.440         4          .0000
```

**Table 6.20: Shows the result of Step Four: The Entry of User Participation Factor in Stepwise Logistic Regression**

This means the inclusion of the **User Participation Factor** in the regression analysis increases the explanation and prediction by approximately 14 per cent (**0.887- 0.75**), all due to the unique incremental predictive power of the **User Participation Factor**.



### 6.9.9 User Training

Even though the **User Training Factor** has a low correlation coefficient and satisfies only one criterion ( $p < 0.05$ ) set in section (3.5), however, for testing purposes, it is included to find out the contribution of this particular variable to the regression model.

Table 6.21 shows the result of the inclusion of **User Training Factor** in the logistic regression model.

- The -2LL value is slightly decreased from 15.531 to 13.720. A smaller value of the -2LL measure indicates a slightly better model fit.
- The Cox and Snell  $r^2$  and Nagelkerke  $r^2$  measures have marginally increased, respectively from  $r^2$  0.635 to  $r^2$  0.645 and  $r^2$  0.887 to  $r^2$  0.902 also indicating a slightly better model fit.



Logistic Regression

Dependent Variable.. VAR00007 The Use of the Intranet  
Beginning Block Number 0. Initial Log Likelihood Function  
-2 Log Likelihood 77.971125  
\* Constant is included in the model.

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number  
1.. IT Staff Training ITST  
Management Support MS  
Availability of Fund RSA  
User Participation UP  
User Training UT

-2 Log Likelihood 13.720  
Goodness of Fit 32.181  
Cox & Snell - R^2 .645  
Nagelkerke - R^2 .902

	Chi-Square	df	Significance
Model	64.251	5	.0000
Block	64.251	5	.0000
Step	64.251	5	.0000

Table 6.21:Shows the Result of Step Five: The Entry of the User Training Factor in Stepwise Logistic Regression

This means the inclusion of the **User Training Factor** in the regression analysis increases the explanation and prediction by only **0.015** per cent (**0.902- 0.887**). This increase is so minimal at exactly 1.5%, where other factors contributes at least 13% to the model it is therefore, not worth including this factor in the model.

6.10 Interpretation of Regression Analysis Result

The results of multiple logistic regression analysis suggest that 89% (Nagelkerke  $r^2$  measure) of the variation in the level of the Intranet usage (**Low to High**) within Omani companies is due to the presence or absence of the above discussed factors. The



remaining variance (11%) is due to extraneous variables (other factors) not included in the model, and/ or to random variance (or error). This is a very high result according to Phelps et al, (1999, p.47) who observed that *"in management models, given the inherent variability due to different people and situational differences, it is highly unlikely that anything close to 100% of the variation will be explained by any model"*.

Furthermore, choosing a significance level of (5% or less), the result of the logistic regression meets the generally recommended value suggested by Baroudi and Orlikoski (1989).

Therefore, great attention should be given to the factors discussed in the study. These results provide initial support for a comprehensive understanding of the use of the Intranet in knowledge management in the developing country organisational context. Taken together the factors not only describe the situation but also provide a prescription model that can guide organisations in the implementation of successful use of an Intranet. This takes into consideration the organisational and human factors involved in successful implementation of the Intranet in knowledge management. The empirical findings suggest that buying hardware and software is not enough. Knowledge management is a complex process that requires a combination of technology and the factors discussed. This empirical finding is consistent with the previous findings that dealt with the implementation of IT in knowledge management. In particular, Earl (1994; 1998) asserts that knowledge management requires a combination of technology and social action; Davenport and Prusak (1998) state that successful knowledge management requires a combination of human and technical factors; Powell and Dent-Micallef (1997) resource-based theory which is based on integrating IT with other factors such as top management commitment and support, training and organisational culture among others. According to the resource-based theory the success of IT is totally dependent on the presence of these factors.

These findings present a challenge to decision-makers, especially IT professionals, who hope to introduce new technologies without serious consideration of the above factors.



## **6.11 Contribution to Knowledge**

This research was able to contribute to the debate surrounding the use of IT in general and the Intranet in particular in the area of knowledge management, which is summarised in the following themes:

- IT can support only explicit knowledge management. Therefore, its role is limited to the management of organisational knowledge in combination mode;
- Modern IT has a greater role in combination and internalisation modes. This theme extends the role of IT to manage some elements of tacit knowledge;
- Modern IT such as the Intranet, can support not only managing explicit knowledge but it can also support tacit knowledge management and consequently support all modes.

The experience of the Omani companies with the Intranet in general is limited to supporting the management of explicit knowledge, which corroborates with the first theme.

The reasons for inability of Omani companies to utilise the Intranet in the management of tacit knowledge may be due to one or all of the following:

- The characteristic of tacit knowledge which is very personal hard to express and communicate and therefore can not easily be managed by technology. According to Nanaka and Takeuchi (1995) Tacit knowledge is deeply rooted in individual's action and experience, ideals, value, or emotion;
- The recent experience of Omani companies using the Intranet which has been concentrated in the area of explicit knowledge;
- The lack of trained, qualified IT staff with most Omani companies, decreases the opportunity of extending the use of Intranet to manage tacit knowledge;
- Cultural factors which include the resistance within the Omani business environment of the use of IT to manage tacit knowledge.



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From a practical point of view, the impact of the Intranet and the identification and analysis of factors that influence the use of the Intranet in knowledge management, may help the organisations in general and the Omanis in particular to:

- Improve their management practices;
- Make the necessary organisational changes in order to utilise the Intranet in this very important domain to its full potential;
- Allocate priorities, funds and resources to where they will most benefit the organisations;
- Balance the approach from being solely technology-centric to being human, organisational and technology-centric.

The major contribution to the body of knowledge from this study is the investigation of the use of the Intranet in knowledge management in the Omani business environment and the examination of factors, which influence the use of the Intranet in knowledge management. The model presented not only gives a description of the use and benefits of the Intranet within Omani organisations but also offers a prescription outlining the factors (see Figure 6.12) that need to be considered in the implementation of the Intranet and the consequent utilisation of the technology to its full potential. Furthermore, the identification of factors is of a great importance, particularly to practitioners hoping to change the attitudes and the behaviour of employees who are reluctant to actively participate in the acquisition and exchange of knowledge. It is hoped to inform practitioners and researchers by publishing the results of this research. This is a crucial aspect of the implementation of the Intranet in knowledge management strategy, and deserves far more attention than it currently attracts.

In addition, researchers may benefit from the theoretical framework, which will form the basis for further empirical research. Practitioners will gain models to guide them implement and use the Intranet to manage knowledge, which is a most valuable resource for a company.



## Chapter Six

The questionnaire survey was able to give a clear picture about reasons for Oman companies' adoption of the Intranet; its use and impact on the Omani organisations and the factors influencing the use of the Intranet, consequently answering the research questions. However, this method has not given a detail explanation of some issues, for example, why the User Training Factor was not highly correlated to the Intranet Usage Level. Furthermore, the inability of questionnaire survey-based to probe the participants for underlying detailed explanations about the affect of culture on the use of the Intranet was clear. Chapter Seven (Qualitative method) will give a clear picture about the role of organisational culture in the use of the Intranet and an explanation of some of the issues that the questionnaire survey was not able to explain. This supports the decision to include qualitative elements in order to achieve the research objectives.

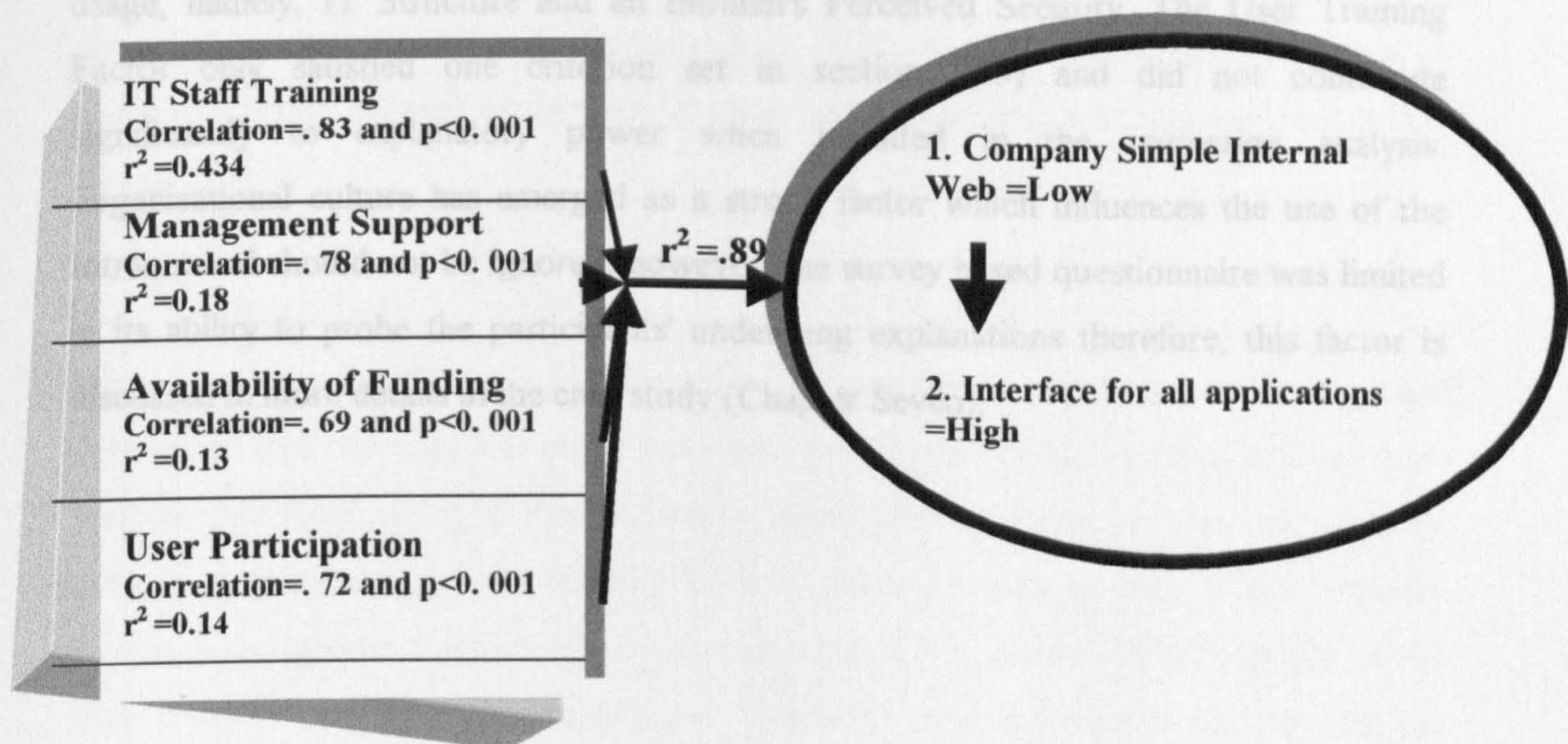


Figure 6.12: Shows Factors that Influence the Use of the Intranet within Omani Companies



**6.12 Summary**

This chapter presents the findings of the quantitative survey. It illustrates the uses of the Intranet in knowledge management within Omani organisations. While most of the participants have indicated the benefits of the Intranet for their organisation in helping them manage organisational knowledge, however, this experience is limited to explicit knowledge. Furthermore, the empirical findings portray the importance of the interaction between IT Staff Training, Management Support, Availability of Funds, and the User Participation Factors with the level of Intranet usage. In other words the difference between low and high use of the Intranet within the Omani private sector organisations is attribute to the presence or the absence of these factors. Seven factors have been identified to influence the use of the Intranet in knowledge management, two variables failed to demonstrate a significant correlation with the level of the Intranet usage, namely, IT Structure and an Intranet's Perceived Security. The User Training Factor only satisfied one criterion set in section (3.5) and did not contribute significantly to explanatory power when included in the regression analysis. Organisational culture has emerged as a strong factor which influences the use of the Intranet and should not be ignored, however, the survey based questionnaire was limited in its ability to probe the participants' underlying explanations therefore, this factor is discussed in more details in the case study (Chapter Seven).



## **Chapter Seven**

### **A Case Study of PDO: The Impact of the Intranet on Knowledge Management in Oman**

#### **7.1 Introduction**

Chapter Six has presented a quantitative analysis and interpretation of data collected through a questionnaire based survey on the impact of the Intranet on knowledge management within Omani private sector organisations. This chapter presents the qualitative analysis and interpretation of data collected through interviews and observation primarily to strengthen the validity of the survey results and furthermore, to probe for further detailed explanation of some issues that were not fully explored by the survey method.

#### **7.2 Background**

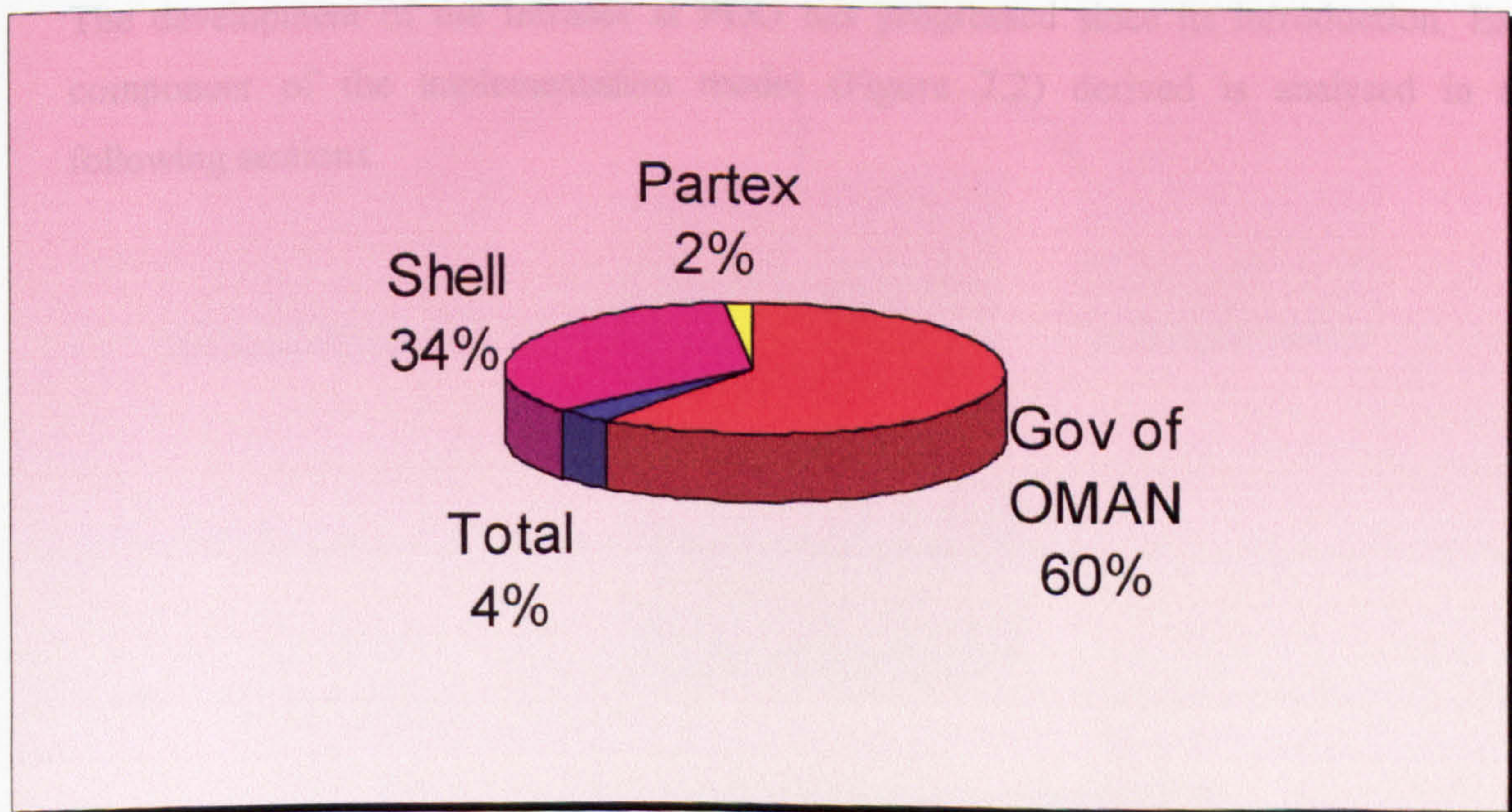
In developing countries such as Oman the introduction of information technologies is very recent and their use and effect have not been systematically assessed or evaluated. Despite, the importance of this subject to researchers and practitioners, the issue of evaluating and assessing the benefits of the Intranet is still an area, which requires further and vigorous research (Blanning and King, 1998; Scott, 1998). The aim of the case study is to assess and evaluate the experience of one Omani Company with the Intranet and to develop a theoretical approach that can guide and benefit other organisations. The findings are based on an in-depth case study looking at the evolution and the progress of the use of the Intranet in knowledge management. The case study basically examines the impact that the use of the Intranet has had to date and is likely to have in the next few years, on one of the earliest organisations to adopt it in Oman. A case study approach based on frequent visits and face to face interviews has been used. The data was collected in two phases; firstly, through casual conversations, in-depth,



informal, and unstructured interviews with PDO staff which took around two weeks; secondly, through semi-structured interviews. Interviews were conducted over a period of six months with key participants responsible for Intranet adoption and development in the company. The most important reason for selecting this particular company over others was the access to data. In other words, the staff concerned have agreed to participate in the study. The implementation and impact models are a theoretical contribution, which may benefit both practitioners and researchers.

### 7.3 Petroleum Development of Oman

Petroleum Development of Oman (PDO) is one of the largest companies in Oman with more than 5,000 employees. The Omani government owns 60% of the company and the rest is divided between the Shell Petroleum Company Limited (34 %), Total (4 %) and the Partex Oman Corporation (2 %). The daily oil production of PDO is 800,000 barrels and the recoverable reserves amount to five billion barrels. The company adopted the Intranet in early 1996 and currently has 4,500 Intranet users.



**Figure 7.1 Shows the Percentage of each Stakeholder in PDO**



### **7.4 Reasons for the Intranet Adoption**

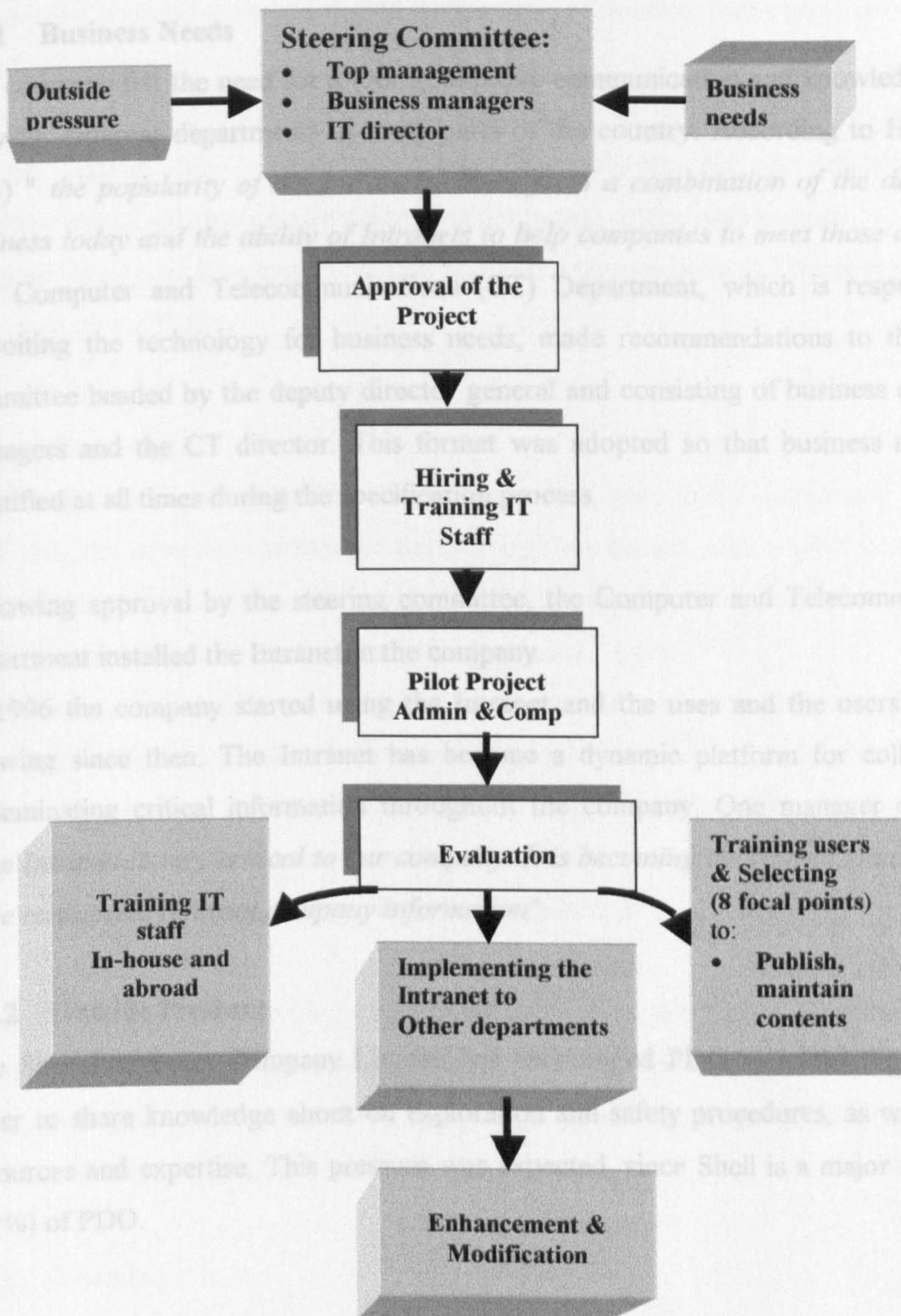
One of the main hurdles facing PDO was how to effectively communicate and share information and knowledge with different individuals and groups inside and outside the country without increasing the costs. Thus, PDO has adopted the Intranet in order to achieve the following goals:

- To improve communication and provide a means by which to help knowledgeable employees from different departments and locations to share information and knowledge;
- To share knowledge , resources and expertise with the Shell group;
- Reduce costs;
- Eliminate duplication and redundancy of information;
- Enable cross-platform compatibility;
- Improve business processes.

### **7.5 The Implementation Model**

The development of the Intranet at PDO has progressed since its introduction. Each component of the implementation model (Figure 7.2) derived is analysed in the following sections.





**Figure 7.2: The Intranet Implementation Model of PDO**



### 7.5.1 Business Needs

The company felt the need for a tool to improve communication and knowledge sharing between different departments in many parts of the country. According to Hills (1997, p.23) " *the popularity of the Intranets comes from a combination of the demands on business today and the ability of Intranets to help companies to meet those demands* ". The Computer and Telecommunications (CT) Department, which is responsible for exploiting the technology for business needs, made recommendations to the steering committee headed by the deputy director general and consisting of business department managers and the CT director. This format was adopted so that business needs were identified at all times during the specification process.

Following approval by the steering committee, the Computer and Telecommunications department installed the Intranet in the company.

In 1996 the company started using the Intranet and the uses and the users have been growing since then. The Intranet has become a dynamic platform for collecting and disseminating critical information throughout the company. One manager commented "*The Intranet is very critical to our company. It is becoming the central system, through it we can access relevant company information*".

### 7.5.2 Outside Pressure

The Shell Petroleum Company Limited has encouraged PDO to adopt the Intranet in order to share knowledge about oil exploration and safety procedures, as well as share resources and expertise. This pressure was expected, since Shell is a major stakeholder (34%) of PDO.

### 7.5.3 Top Management Approval

After evaluating the needs, the committee proposed the adoption of an Intranet for approval. The approval of top management guaranteed commitment to the project and the approval and provision of resources for its start and continuation. In addition, the approval and support of top management, according to one participant, "*signalled the*



*importance of the project to the organisation. Furthermore, it was regarded as a vehicle for sending a signal to the employees by executives about the importance of the Intranet to the organisation".*

Wang (1994) takes the discussion a little further by arguing that top management support enables the creation of a favourable climate for the introduction and development of information technology for the benefit of the organisation.

Whether as a result of outside pressure, business needs or both, the Intranet project was approved by the PDO.

### 7.5.4 Pilot Project

After hiring an expert in Intranet technology with many years' experience working in Gulf Air, the company started the Intranet implementation with a pilot project, in the CT and administration departments. At the same time, the company sent two employees for further training with Shell in the Netherlands for 3 weeks.

The rationale for the pilot project was that the investment was smaller and the mistakes were less costly than for the whole project. The pilot project was an opportunity to learn and avoid mistakes during the full Intranet implementation, thereby increasing the chances of success. Furthermore, as stated by one participant, the pilot project aimed to *"provide PDO staff with an example of the usefulness of the Intranet applications"*.

Bidgoli (1999, p.82) summarised the usefulness of a pilot study by stating that *" it provides the design team with an opportunity to preview possible problems before a full scale implementation"*. Therefore, knowledge gained from the pilot project can be transferred during the full Intranet implementation.

### 7.5.5 Training

After evaluating the pilot experiment, the IT department installed the Intranet in other departments. The Computer and Telecommunications department had to train 8 focal points (representing different departments) intensively in order to ease the pressure of the CT department's inputting and maintaining the contents for each department. From then on, these 8 focal points were responsible for developing and maintaining the timeliness and accuracy of the various types of information in each department. The role



of the computer department became purely technical by providing the Intranet infrastructure. Today, the focal points have grown to 200 in order to fulfil the high demand in different departments. At the same time, intensive training programmes were followed by CT staff both locally and abroad in order to provide better services for users. This is a theme echoed in many investigations, Scott (1998, p.14) for example states that "many IS developers need reskilling, training, motivation and time to gain web systems development skills".

This issue is of particular importance for developing countries in which, according to both Jayasuriya (1993) and Kirlidod (1996), there is a lack of qualified IS personnel. Therefore, continuous training is essential for IT staff development. Others employees, the users, were trained, however, only for short sessions for the following reasons:

- The Intranet user needs only a little assistance because of the point-and click-nature of the hyperlinks to search for information, view documents and post to discussion groups;
- The awareness and the usage of the Internet (which started long before the adoption of the Intranet) means that even inexperienced users of the Intranet would be familiar with the basic requirements of how to access and share information.

### **7.5.6 Feedback and Evaluation**

Feedback and evaluation of the pilot is recognised as an important step following implementation. Feedback from both users and IT professionals was taken in order to avoid mistakes during the Intranet implementation period. Feedback may include the suitability of the project for the kind of work it is intended to achieve and cultural considerations which need to be dealt with before the full implementation. Careful consideration must be given to this step before proceeding to full Intranet implementation. The thorough assessment and evaluation of the pilot project can lead to fruitful results during the full implementation.



### 7.5.7 Enhancement and Modification

Enhancement and modification is the final step in the implementation model. This step has been designed to add more functionality, solve (or redesign) problem areas, and add more applications and users. This process is very important for two main reasons:

1. User's needs constantly change due to the dynamic business environment;
2. Fast technological change.

According to Bhattacharjee (1998, p.270) "*emerging technologies (such as the Intranet) require close monitoring and careful management even well after its installation and subsequent adjustments may be required to ensure its effective utilisation*". Therefore, more attention should be given to this step and resources must be allocated for enhancement and upgrading. If an IT project is terminated in mid stream, the organisation concerned could lose not only the costs, but also the time and effort spent and the competitive advantages achieved by the system.

The implementation model (see Figure 7.2) which can aid IT professionals in implementing the Intranet is an important contribution made by this research.

### 7.6 The Intranet Impact Model

Many of the articles on the Intranet to date concentrate on organisations in developed countries (Curry and Stancich, 2000; Davies, 2000; Drew, 1999; Hansen et al., 1999; Hills, 1998; Kim, 1998; Scott, 1998; Willcocks, et al., 1998). Among these articles, there is evidence to suggest that the Intranet has had an impact upon many business aspects and processes. For example, the Intranet improves access to updated information, improves communication, enables knowledge sharing and IT integration, flattens organisational hierarchies, reduces costs, improves decision making, empowers users and facilitates organisational knowledge and learning. Furthermore, Callaghan (1998) states that the Intranet has broken down internal divisional barriers to communication.



The Intranet impact model presented in Figure 7.3 shows that this technology has affected many processes and business aspects. In the following sections each component of the Impact model is discussed.

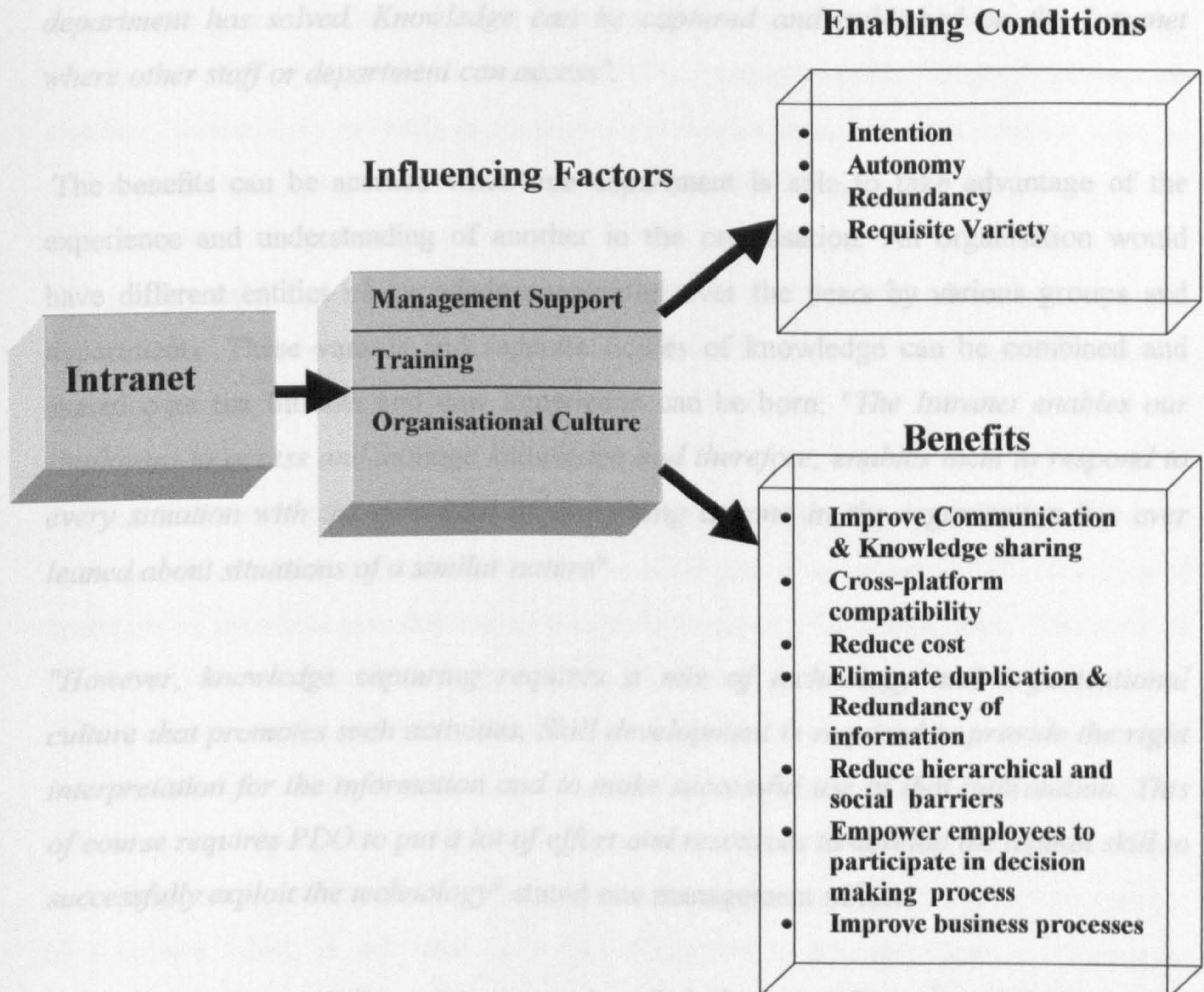


Figure 7.3: The Intranet Impact Model

### 7.6.1 The Intranet Improves Communication and Knowledge Sharing

PDO has 4,500 users who use the Intranet to share, not only static information, but dynamic knowledge about engineering, oil exploration, and safety procedures. According to a senior manager *"The Intranet enables our employees know where to go to find what they need to know regardless of location and time barriers"*.



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*"Knowledge capturing is an important area for PDO success, which is highly considered. The practice of each department doing business in isolation from others is not practical anymore; duplicating or solving the same problem, which another department has solved. Knowledge can be captured and published on the Intranet where other staff or department can access".*

The benefits can be accrued when one department is able to take advantage of the experience and understanding of another in the organisation. An organisation would have different entities of knowledge generated over the years by various groups and departments. These various and separate bodies of knowledge can be combined and shared over the Intranet and new knowledge can be born. *"The Intranet enables our employees to access and manage knowledge and therefore, enables them to respond to every situation with the sum total of everything anyone in the organisation has ever learned about situations of a similar nature"*

*"However, knowledge capturing requires a mix of technology and organisational culture that promotes such activities. Skill development is required to provide the right interpretation for the information and to make successful use of that information. This of course requires PDO to put a lot of effort and resources to develop the human skill to successfully exploit the technology"* stated one management officer.

One of the most used discussion groups is called 'Speakers Corner', which is an open discussion about all matters concerning the company. Knowledge about oil exploration, engineering, safety rules and regulations is discussed and shared. One senior manager commented *"Any employee can post any thing on the Speakers Corner and this ensures democratic contribution and equal consideration of ideas. There is a big commitment from top management to make the Speakers Corner successful. Top Management are participating in the Speakers Corner and providing answers for the issues discussed. Furthermore Top Management are listening and benefiting from issues that are discussed via Speakers Corner to find solutions and feedback where it can be used to develop and improve services"*.



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The idea is to make individual knowledge available to others. This concept is one of the most important principles in knowledge management. It is the main and the most important activity of the knowledge-creating company. According to Nonaka (1994) it should take place continuously and includes all levels of the organisation. A senior information advisor with P.D.O. stated that *"The Intranet enables bringing information together, (through hyperlinks) in most cases it comes from extremely diverse sources and combining them in such a way that enables new ideas to emerge"* A senior information advisor stated.

Top management can take the opportunity and the potential presented by the Intranet to communicate the company's mission, vision and strategy directly and quickly not only to the employees but also to business partners and customers.

The Speakers Corner is a knowledge and information sharing opportunity, which is open not only to PDO employees, but also to Shell group personnel as well. The idea of openness to outsiders instantly raised concerns amongst PDO employees. This kind of resistance was anticipated and was reported by many researchers. For example, Scott (1998) stated that apparently resistance to Internet based technology is even greater in Asia than in the US or Europe due to cultural differences and, in part, the Internet is viewed as an American conspiracy. The idea of the openness of Internet based technology may raise the fear of losing resources, disclosing secrets and embarrassment in a culture which is not used to a full disclosure in business dealings. However, management felt that PDO is a learning organisation and the Intranet should be open to Shell group users and vice versa to benefit the company.

One participant stated, *"The Intranet should be viewed as a learning opportunity for both companies. PDO can learn from the expertise of Shell Group about oil exploration, engineering, safety procedures and best practice by accessing to the Shell Intranet"*. However, one must be careful and sensitive before importing other cultural approaches to solving local problems or needs without careful consideration for the usefulness of such an approach in a local context.



According to one manager, *"The Omani environment is different from the Northern Sea and Netherlands environment, therefore, careful consideration and interpretation in applying other's solutions to local needs is required"*.

With top management support and guidance the Intranet has enabled an appropriate new culture of openness to be accepted. The idea of openness to the outsider (Shell Group) is an important cultural transformation, which was difficult with previous technology. According to Davenport and Prusak (1998), the presence of knowledge-based technologies such as the Intranet can have a positive effect on organisational culture. However, the researcher argues that the presence of technology does not guarantee its use if organisational or cultural issues discourage it.

### **7.6.2 Reduce Hierarchical and Social Barriers and Empower Employees**

The Speakers Corner became an opportunity to break organisational and social hierarchical barriers and to create knowledge by allowing employees to ask questions, provide (or propose) solutions, and transfer best practice, overcoming the barriers of distance and time.

The Intranet helps open organisational boundaries, with many employees from different departments and hierarchical positions participating in the Speakers Corner discussing issues which, before the Intranet, were limited to formal meetings that involved senior employees in the company in most cases. The Intranet enables a wider audience to participate in the decision making process and increase informal participation. Consequently, increasing individual autonomy is one important principle in knowledge management (Nonaka, 1994).

The diversity of participants can create an extremely unique opportunity where new ideas can emerge. The idea of wide participation is very important for organisational knowledge to grow, where individual knowledge can be consolidated with group knowledge through technology so that new ideas can be discussed, debated, and even discarded if necessary. In this way new knowledge could be born which will have a



higher possibility of survival and which can then be integrated into the organisation's knowledge (Inkpen, 1998).

The ability of Internet technologies in knowledge capturing and knowledge dissemination to a wider audience, which can transcend organisational boundaries (Earl, 1994; Earl, 1998), makes these technologies important tools for knowledge management. Indeed, these technologies facilitate knowledge building through the exchange of ideas, papers, hypotheses, data, messages and even gossip (ibid).

The effect of the Intranet on PDO employees is quite noticeable. IT empowers PDO employees to participate in the company strategy regardless of position and location. Before the Intranet, information flowed vertically through the PDO hierarchical structure. The request for information had to flow up or down through the chain of command, which was usually rigid and took a long time. The Intranet has changed this to a certain extent. Indeed, several empirical studies have reported the assertion that the Intranet empowers employees to participate in the decision-making process (Callaghan, 1998; Kim, 1998; Scott, 1998). Furthermore, Earl (1998, p.47) observed the impact of knowledge based technology on Shorko "not only a democratising force,.... , but as an equalising force where technical and knowledge based skills entitle you to join the meritocracy and sharing knowledge entitles you to stay". This, observation is true to a great extent for PDO staff and consequently confirms Earl's (1998) finding.

### 7.6.3 Reducing Cost and Eliminating Duplication

Cost reduction has been achieved on paper printing, telephone directories, forms, policy and safety procedures and inventory reports. With the Intranet, one copy can be posted and any employee can access the document at any time from any place. This helps to eliminate unnecessary duplication of information and costly unwanted redundancy while, at the same time making it easy and quick to update.

The knowledge management officer with P.D.O. stated that *"We have more than 4,000 of different documents (Document management, control documents, business records*



*and reports, engineering and building drawings..etc).* These documents represent the company knowledge and information accumulated over the years. They contain vital business information, which now can be accessed by a wider audience. *"About 60 per cent of these documents today are on the Intranet, which save the company a lot of money. Employees can easily search different topics contained in these documents by selecting a topic or a keyword".*

The Company emphasises the importance of reducing the cost per barrel of Omani oil through innovation and technology and producing more for less. One manager stated that *"The need to cut expenditure and produce more oil at a reduced unit cost remains the strategic goal for survival in fluctuating market price"*. This is an important cost reduction for our organisation but more importantly, comments a senior information advisor, *" PDO is experiencing a huge cultural change moving from paper documents to almost all materials published on the Intranet in a relatively short period of time. The Company has achieved from 60% to 70% reduction of hard copy output so far. This finding is consistent with Curry and Stancich (2000, p.253) who stated that "clear direct advantages of intranets are the reduction in duplication of information, reduction in paper/video/audio copying and distribution costs and faster, more direct access to information"*.

The major benefit of Intranet technology derives from its role as an on-line, on demand information dissemination tool. Using the Intranet PDO has transformed from a calendar-based document publishing strategy to one based on need. This transformation not only results in cost reduction of information disseminating but also improves access to a wider audience with updated information.

### **7.6.4 Improve Business Processes**

Human resources (HR) is one of the important departments using the Intranet in PDO. The vision is to provide a quick and easy means of access to and awareness of HR information, activities and services. PDO is exploiting information technology in order to achieve this goal. The Human Resources department has developed its own Intranet called 'Infolink', the explicit strategy of the Infolink is to *"bring previously difficult- to-*



*find information, policies, procedures and forms direct to employees' computers" one participant stated.*

The designer of the Infolink stated that the site promises that *"Human Resources information can be accessed with just two clicks of the mouse"*. Isolating the company knowledge in one or two functional departments like IT or HR from those who need it, consequently risks losing its benefits (Gable, 1994).

One senior information advisor comments that *"using the Infolink we are able to cut down on admin time and make the processes connected with recruitment, departures and personnel changes, such as promotions or job moves, smooth, easy and open"*. A better understanding of the interaction between different processes has allowed PDO to save time and money whilst providing better services to employees and customers.

The use of the Intranet enables HR to eliminate many of the routine paper processing tasks. According to a senior information advisor, *The so-called 'Smart Forms' which will be launched in a few months, will be circulated in cyberspace, picking up signatures as they go and then, when they return, they are complete, automatically updating records"*. The Internet technologies have played an important role in changing business processes, which can save organisations and employees time and money.

Another important application of the Human Resource Intranet is the SAPpHiRe Online, database which as part of the Infolink, provides access to all PDO employees. The SAPpHiRe enables *"all the staff to access their own personal information"*. This self-access service provides the employee with all the information he/she needs. Furthermore, SAPpHiRe provides the employee with the ability to update specific information in his / her file (for example, Address, Telephone number, Email...etc). SAPpHiRe also provides feedback to the company to enhance certain services and solve problems through the use of surveys. This facility enables the employee to give opinions and raise concerns. The results of the survey can be accessed by all employees through SAPpHiRe . Staff Appraisal Forms can be found on the Intranet and the



supervisor(s) can complete the form to evaluate the appraisee. The relevant staff member can, therefore, access the evaluation and feedback on his /her performance.

### 7.6.5 Cross Platform Compatibility

Exploration and Production is another department, which uses the Intranet very heavily. Geologists and Geophysicists are able to access and share information from different databases and different platforms (PCs, Mainframes, and Macs) via the Intranet. The Intranet allows cross-platform compatibility, therefore, it does not matter where knowledge resides. Tools such as browsers enable users to access and share information and knowledge from and between different platforms that have stored information and knowledge (Kim, 1998; Scott, 1998; Tan, and Uijttenbroek, 1997). Similarly, Davenport and Prusak (1998) stated that " Internet based technology is ideal for publishing information across multiple types of computer platforms, for multimedia databases, and for displaying knowledge that is linked to other knowledge through hypertext links".

*"The Intranet enables the interpreters to merge seismic data from different databases to narrow down the uncertainties"* one PDO participant indicated.

Geologists and Geophysicists can easily access different Topographical Maps, which contain information about the oilfields in the country. Using the Intranet, exploration, engineering, production and economic solutions are easily provided and accessible.

PDO has adopted a holistic view, which consolidates the technology and human and organisational factors, required in using the Intranet in knowledge management. The Intranet has played an important role in providing a ubiquitous interface to organisational knowledge (Davies, 2000), while the process of interpretation and turning scientific data into realistic geological models requires the experience and knowledge of highly trained geologists and geophysicists. Ambiguities, uncertainties, and sometimes gaps in the data mean that interpretation based on experience or intuition remains the key to PDO's successful oil exploration.



## **7.7 Future Development of the Intranet**

The company is planning to utilise the Intranet even further in the future to include:

- More dynamic information on the Intranet;
- More users, especially those employees working in various oilfields in the desert area;
- Filtering information, more preference information to suit the employees' needs;
- Front end to all applications;
- Arabisation of some contents of the Intranet, especially ones dealing with safety regulations and procedures;
- Virtual teams and collaboration facilities..

These future developments are very important for knowledge building, especially the provision of effective information filters and Arabisation.

- Arabisation is important because not all PDO employees know English very well and they need to be given the opportunity to participate in the company knowledge building process. Failure to be inclusive has moral and business nuances; it isolates a section of the workforce therefore, prevents the company benefiting from their valuable contribution.
- Filtering information is another important concept in knowledge building strategy. Information ought to be tailored to suit individual needs and employees should not be overloaded with information that is not relevant to what they are doing. Employees should have access to enough information that helps them respond to the challenge provided by the business environment but they should not be overloaded with information (Nonaka, 1994; Scott, 1998). A lot of raw information may be of little importance and could be considered as a waste of time and effort if is not tailored to the organization and employees' needs.



- Collaboration between individuals and teams of employees is considered to be an essential element in modern organisations. The Intranet presents a potential vehicle for enhancing collaboration between team members, departments and experts within the organisation or with outside experts by eliminating barriers of time and distance. PDO has to exploit the potential presented by the Intranet to enhance collaboration. The Intranet enables the transfer of tacit knowledge by connecting people with the same interests to collaborate and share best practice (Davies, 2000). It also enables online discussion groups, and video conferencing and is capable of providing some degree of informality, feedback and spontaneity. Consequently, the Intranet can support and facilitate remote collaboration, which is an important aspect to PDO's success. In summary the Intranet has not been used for collaborative purposes at PDO, however, it is highly under active consideration for the future.

These future developments are important to PDO's knowledge management building and the competitive position of the company. This case study and the two mini case studies (Chapter Four) suggest that Omani companies seem to be taking a conservative approach toward Intranet implementation and assimilation, preferring a gradual implementation to radical process changes. The gradual implementation philosophy may be based on taking the opportunity to learn and avoid mistakes and develop the necessary expertise, thereby, increasing the chances of success. This conservative approach is based on the idea that, in order to maximise the benefit of the technology, proper planning to re-evaluate business need and careful implementation are required. The gradual approach is arguably a good philosophy if it means proper planning and careful implementation. However, it may be a bad strategy if this gradual approach relates to the culture of Omani organisations in which taking a decision, may take a long time. A drawback of this strategy is that companies may miss the opportunity of exploiting the full potential to gain competitive advantage of the new technology before others.



## 7.8 Validation of Data

The purpose of including qualitative elements in this study is to increase the robustness of results and enable the cross-validation which can be achieved when information is gathered from different sources. Table 7.1 shows the participants' views regarding different aspects obtained by both quantitative and qualitative data. Furthermore, Table 7.1 also shows the consistency of findings obtained by quantitative and qualitative data (questionnaire-based survey and case study) to strengthen the confidence in the validity of the findings.

Participants' views	Questionnaire-based Survey(Quantitative)	Case Study(Interviews) (Qualitative)
Reduce costs	• 85%	• 100%
Requisite variety (Response to challenge)	• 100%	• 80%
Intention	• 100%	• 100%
Cross-platform compatibility	• 19%	• 70%
Save time & effort	• 89%	• 100%
Improves communication	• 87%	• 90%
Top management support	• 80%	• 100%
IT staff training	• 83%	• 100%
User Training	• 20%	• 20%
Organisational Culture		• 100%

**Table 7.1 The Congruence between Quantitative and Qualitative Data**



## **7.9 Contribution to Knowledge**

The case study has contributed to the literature concerning the impact of the Intranet on knowledge management by giving a detailed account of one Omani company's experience. The evidence suggests that case study finding has validated and reinforced the survey questionnaire finding. Furthermore, the case study, has given explanations of some issues which were not accessible due to the difficulty of obtaining detailed explanations by means of the survey based questionnaire. The case study has demonstrated that the Intranet empowers PDO employees to participate in the company strategy regardless of position and location and consequently has flattened the organisational hierarchy. Furthermore, PDO staff from different departments and locations are able to communicate with each other and share knowledge thus the Intranet has contributed to the elimination of internal divisional barriers. In addition with top management support and guidance the Intranet has enabled an appropriate new culture of openness to be accepted. The idea of openness to an outsider the Shell Group is an important cultural transformation, which was difficult with the previous technology. This is an important cultural change in PDO's history. PDO and other Omani organisations can build on this experience to utilise the technology for future opportunity and collaboration at national and international level.

The implementation model shows the steps that have been taken in the adoption and implementation of the Intranet and consequently may give guidance in helping new organisations who want to implement the Intranet. The impact model shows that the Intranet has affected many processes and business aspects. Furthermore, it shows the importance of top management support to overcome the human and cultural barriers that stand against better utilisation of the Intranet, as well as showing how to develop a culture of shared values that can be a benefit of the adoption of the Intranet in managing organisational knowledge. The importance of training in the transformation of PDO culture to utilise the Intranet in knowledge management activities is evident. The adoption of the Intranet represents a change in the way an organisation manages its information and knowledge. Therefore, the model recommends the interaction of management support, training, and organisational culture to minimise resistance and



motivate employees to use the system. The implementation and impact models are important contributions for researchers and practitioners alike, since this investigation is the first in the country. The models can be adopted and used by other organisations with minor modifications for cultural differences, particularly for organisations in Arab countries that are looking toward the Intranet as the main means of knowledge management.

## **7.10 Summary**

Today, organisations are increasingly dependent on information technology (IT) to manage organisational knowledge. PDO is one of the largest companies in Oman that uses information technology to manage its knowledge. This case study presents the impact of the Intranet on knowledge management within the PDO. The implementation model shows the steps that have been taken in the adoption and implementation of the Intranet. The impact model shows that the Intranet has affected many processes and business aspects. Furthermore, it shows the importance of top management support in overcoming the human and cultural barriers that stand against better utilisation of the Intranet, as well as how to develop a culture of shared values that can be a benefit of the adoption of the Intranet in managing organisational knowledge. The importance of training in the transformation of PDO culture to utilise the Intranet in knowledge management activities is evident. The adoption of the Intranet represents a change in the way an organisation manages its information and knowledge. Therefore, the model recommends the interaction of management support, training, and organisational culture to minimise resistance and motivate employees to use the system. The implementation and impact models are important contributions for researchers and practitioners alike, since this investigation is the first in the country. The models can be adopted and used by other organisations with minor modifications for cultural differences, particularly for organisations that are looking toward the Intranet as the main source of knowledge.



## **Chapter Eight**

### **Conclusion**

#### **8.1 Introduction**

Chapter Seven began with the objective of conducting an in-depth look at one Omani organisation's experience with the Intranet, and answering specific questions about the use and impact of this technology on this particular organisation. The main purpose of this chapter is to present the conclusions of this research

#### **8.2 An Overview of the Research**

In today's competitive and global business environment, knowledge is considered a company's most valuable resource (Earl 1994; 1998; Nonaka, 1991; 1994; Nonaka et al., 1998; Scott, 1998). Accordingly, making this knowledge easily accessible to the right people at the right time and the right place is crucial for companies' success and survival in a global/ national environment.

Information and knowledge particularly in developing countries is scattered in various places and in many systems, which makes it difficult to share, access and find when urgently needed. Organisations over the past three decades have used IT to manage information and knowledge. However, previous technologies have not proved adequate for successfully managing knowledge since it is very difficult, if not impossible, to access and share information and knowledge from and between heterogeneous systems (Bidgoli, 1999; Sridhar, 1998; Scott, 1998).

The advancement in technology has led to the development and the establishment of the Internet technologies, which, when used within the organisational boundaries, is termed an Intranet.

Recent studies have advocated the use of the Intranet to manage organisational knowledge (Bernard, 1998; Davenport and Prusak, 1998; Davies, 2000; Drew, 1999; Harvey et al., 1998; Hills, 1998; Gonzalez, 1998; Kim, 1998; Scott, 1998, Willcocks, et al., 1998). Among these articles, there is evidence to suggest that the Intranet had an impact upon many business aspects and processes. For example, the Intranet improves



access to updated information, improves communication, enables knowledge sharing and IT integration, flattens the organisational hierarchy, reduces cost, improves decision making, empowers users and facilitates organisational knowledge and learning. Most of the writings on the Intranet to date concentrate on organisations in developed countries. No previous research dealing with the impact of the Intranet on knowledge management within organisations in developing countries in general and Oman in particular has been undertaken, thus leaving the way open for this study.

The debate surrounding the use of IT in knowledge management, the opportunity presented by new IT, especially the Intranet, the need for a tool to help Omani companies manage their knowledge and the researcher's experience in managing and using IT in knowledge management were the main inspiration for this research.

The reasons for the selection of the Omani private sector to be the focus of this research are due to the important role the private sector plays in the economic, industrial, and technological development of Oman. Furthermore, the private sector was the first to adopt the Intranet in Oman. Yet little research was carried to investigate the impact of the Intranet on this sector.

The main objectives of the research are twofold. The first objective of the research is to investigate the use and impact of the Intranet on knowledge management within Omani companies. The second objective is to identify and examine factors that influence the use of the Intranet on knowledge management within the Omani companies. In other words what factors make one Omani company's usage of the Intranet higher than another using the Gartner Group (1996) classification that was discussed in Chapter Three.

The main components of the research are, the Intranet, its uses and impact on knowledge management within the Omani companies and the factors that influence the use and the impact of the Intranet within Omani organisations and make one organisation uses of the Intranet is better (or Higher) from others.

In order to pursue the research that would contribute to knowledge, a model was developed which reflected the objectives (see Chapter Four, Figure 4.2). The **Declared and Validated Approach** - that on one hand a researcher doesn't directly go into fieldwork without intensive review of the literature, and on the other hand, doesn't totally rely on the literature review without testing the validity of the theoretical



approach, before the full work is carried out- was used to derive the model. The purpose is to make sure the selected approach is suitable. This strategy relates theory to practice and only through fieldwork, the applicability of the theory and complete understanding can occur.

A quantitative survey was used as the main method to collect the data, however, some qualitative means were used in each of two mini case studies to test the validity of the proposed model and detailed case study during the full work. Through the strategy of multiple paradigms, the robustness of results can be increased and cross-validation can be achieved when information is gathered from different sources (Gable, 1994). This process is also called triangulation (Jik, 1989) which helps reduce the impact of bias, improve data accuracy and validity and consequently improving the results of the research.

The findings of the study are mostly based on 80 participants (mostly IT directors) representing 40 Omani private sector organisations that have adopted the Intranet and agreed to participate in the study and also a detailed case study of one Omani organisation.

A number of statistical techniques were used to derive to the results which can be summarised as follows:

- Descriptive statistical techniques were used to investigate the use and impact of the Intranet on knowledge management within the Omani organisations;
- Spearman's correlation technique was used to investigate the relationship between the dependent variable **the level of Intranet usage; Low, Medium and High**) and the independent variables (**Management Support, IT Staff Training, User Participation , Availability of Funding, User Training, IT Structure and Intranet Security**);
- Regression analysis

Although the Spearman correlation analysis indicated a strong relationship between most of these factors and the use of the Intranet at a statically significant level, however, this relationship does not explain the variation in the Intranet usage level (Low, Medium and High) that are explained by the factors investigated in this research. Therefore,



further investigation of the relationships was required and regression analysis was carried out.

A number of conclusions can be drawn from the research findings. Therefore, the first part of this chapter discusses the contribution to knowledge. The chapter also looks at the limitations of the research and the area of further research. Finally, suggestions and guidelines were also proposed for practice.

### **8.3 The Contribution to Knowledge**

This research was able to contribute to the debate surrounding the use of IT in general and the Intranet in particular in the area of knowledge management. This can be summarised by focusing on the following themes:

- IT can support only explicit knowledge management. Therefore, its role is limited to manage organisational knowledge to combination mode.
- Modern IT has a greater role in combination and internalisation modes. This theme extends the role of IT to manage some elements of tacit knowledge;
- Modern IT, such as the Intranet can support not only explicit knowledge management but can also support tacit knowledge management and consequently supports all modes.

The experience of the Omani companies with the Intranet in general is mostly limited to support for the management of explicit knowledge, which corroborates with the first theme.

The reasons for Omani companies' inability to utilise the Intranet in the management of tacit knowledge may be due to one or all of the following:

- The characteristic of tacit knowledge which is very personal, hard to express and communicate and therefore it is difficult to manage by technology;
- The recent experience of Omani companies using the Intranet and their effort was made first to manage explicit knowledge;



- The lack of trained qualified IT staff in most Omani companies which prevents the extension of the use of Intranet to manage tacit knowledge;
- Culture factors (resistance of the Omani business environment to the use of IT to manage tacit knowledge) and preferred face-to-face modes of communicating and transfer of tacit knowledge between individuals.

From a practical point of view, the impact of the Intranet and the identification and analysis of factors that influence the use of the Intranet in knowledge management, may help the organisations in general and the Omanis in particular to:

- Improve management practices;
- Make the necessary organisational changes in order to utilise the Intranet in this very important domain to its full potential;
- Allocate priorities, funding and resources where they can be of most benefit to the organisations;
- Balance the approach from being solely technology-centric to being human, organisational and technology-centric.

The major contribution to the body of knowledge from this study is the investigation of the use of the Intranet in knowledge management in the Omani business environment and the examination of factors, which influence the use of the Intranet in knowledge management. The model presented (see Figure 8.2) not only gives a description of the use and benefits of the Intranet within Omani organisations, but also offers a prescription of the factors that need to be considered in the implementation of the Intranet and the consequent utilisation of the technology to its full potential. Furthermore, the identification of factors is of a great importance particularly to practitioners hoping to change the attitudes and the behaviour of employees who are reluctant to actively participate in the acquisition and exchange of knowledge. Practitioners and researchers can be informed by publishing the results of this research. This is a crucial aspect of the implementation of the Intranet in knowledge management strategy and deserves far more attention than it currently attracts.



The questionnaire survey was able to give a clear picture of the reasons for Omani companies' adoption of the Intranet; the use and impact of the Intranet on the Omani organisations and the factors influencing the use of the Intranet. Although answering most of the research questions, the limitation of this method in providing a detailed explanations of some issues (for example, the User Training factor was not highly correlated to Intranet Usage Level within Omani companies was apparent). Furthermore, the inability of a survey-based questionnaire to probe the participants for underlying detail explanations about the effect of culture on the use of the Intranet. Qualitative method (the case study) gave a clear picture about the role of organisational culture in the use of the Intranet and explanations of some of the issues that the questionnaire survey was not able to explain.

The case study has contributed to the literature concerning the impact of the Intranet on knowledge management by giving a detailed account of one Omani company's experience. The case study finding has validated and reinforced the survey questionnaire's findings. Furthermore, the case study, has given an explanation of some issues which was not possible of getting detail explanation through questionnaire based-survey. The case study has demonstrated that the Intranet empowers PDO employees to participate in the company strategy regardless of position and location and consequently has flattened the organisational hierarchy. Furthermore, PDO staff from different departments and locations are able to communicate with each other and share knowledge thus the Intranet has contributed to the elimination of internal divisional barriers. In addition, with top management support and guidance, the Intranet has enabled an appropriate new culture of openness to be accepted. The idea of openness to an outsider the Shell Group is an important cultural transformation, which was difficult with the previous technology. This is an important cultural change in PDO's history. PDO and other Omani organisations can build on this experience to utilise the technology for future opportunity and collaboration at national and international level.

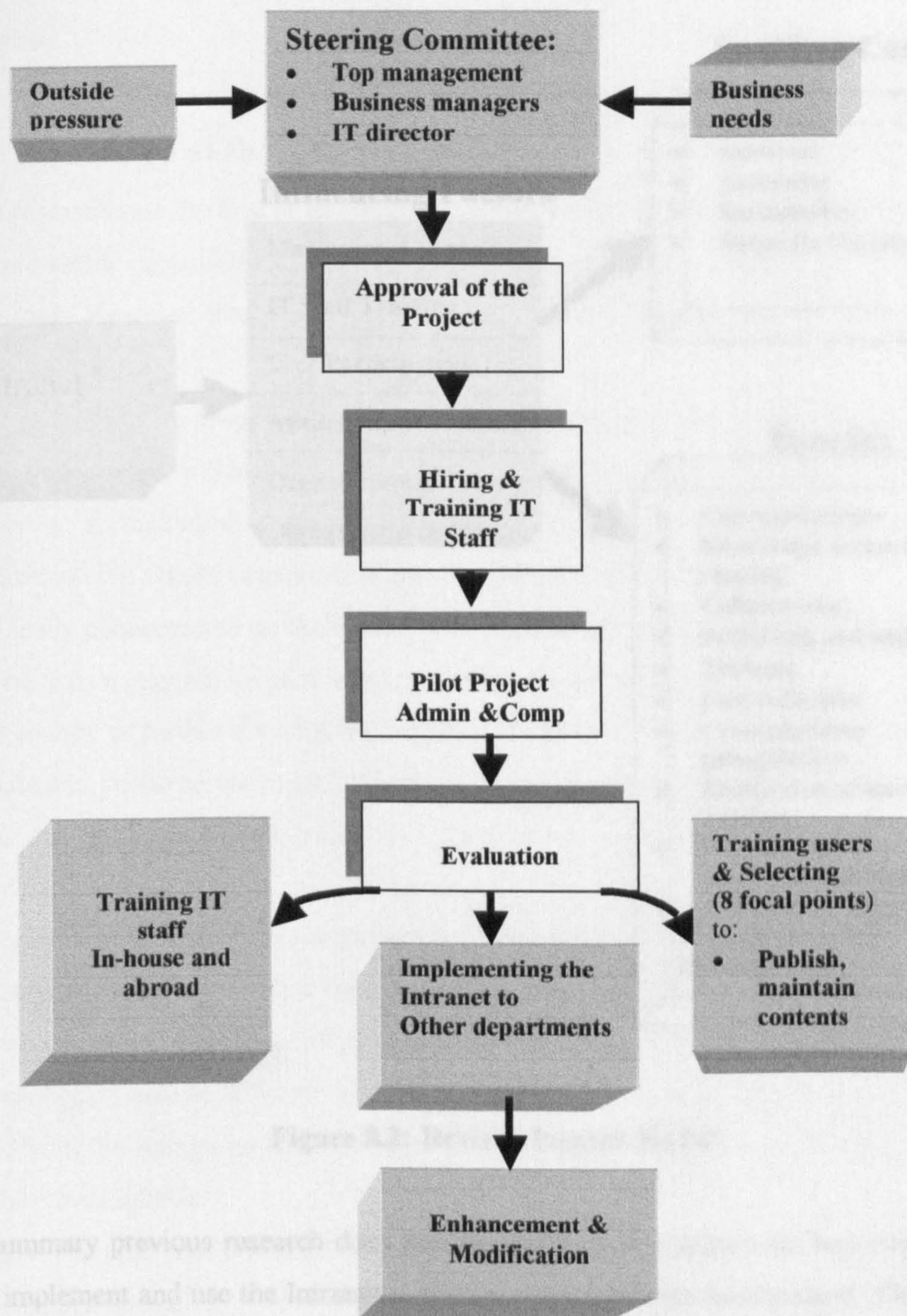
The implementation model (see Figure 8.1) shows the steps that have been taken in the adoption and implementation of the Intranet and consequently may give guidance in helping new organisations which want to implement the Intranet. This is an important



contribution to knowledge, which can aid IT professionals in implementing the Intranet in their organisations. The Impact Model (see Figure 8.2) shows that the Intranet has affected many processes and business aspects. Furthermore, it shows the importance of top management supporting overcoming the human and cultural barriers that stand against better utilisation of the Intranet, as well as how to develop a culture of shared values that can benefit from the adoption of the Intranet in managing organisational knowledge. The importance of training in the transformation of PDO's culture so it can utilise the Intranet in knowledge management activities is evident. The adoption of the Intranet represents a change in the way an organisation manages its information and knowledge. Therefore, the model recommends the interaction of management support, training, and organisational culture to minimise resistance and motivate employees to use the system. The implementation and impact models are important contributions for researchers and practitioners alike, since this investigation is the first in the country. In addition researchers may benefit from the theoretical framework, which will form the basis for further empirical research. Practitioners have gained models to guide them implement and use the Intranet to manage knowledge, which is a most valuable resource for a company.

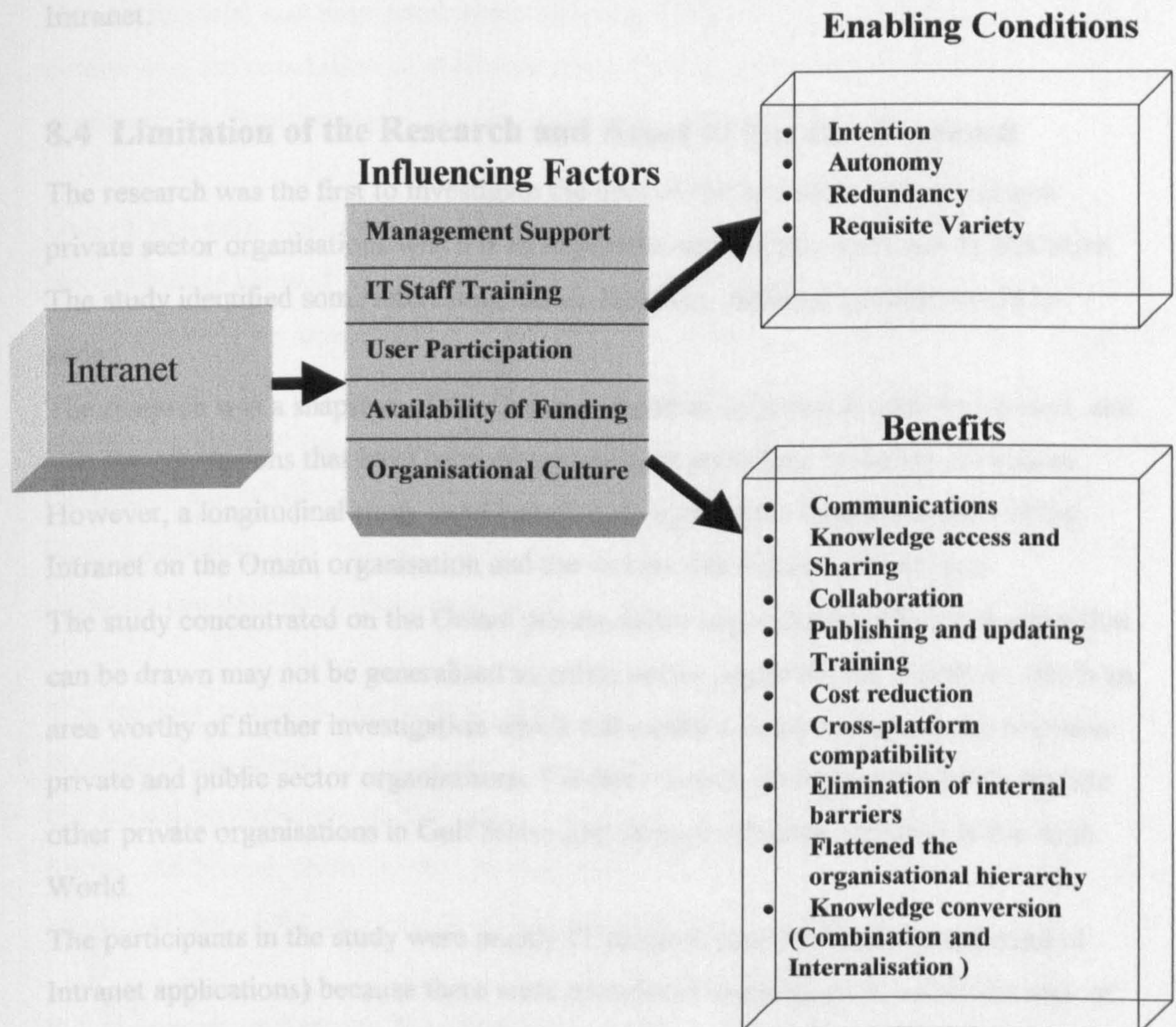
The models can be adopted and used by other organisations with minor modifications for cultural differences, particularly for organisations in Arab countries that are looking toward the Intranet as the main source of knowledge.





**Figure 8.1: The Intranet Implementation Model of PDO**





**Figure 8.2: Revised Impact Model**

In summary previous research does not provide a clear guidance on how organisations can implement and use the Intranet in the area of knowledge management. This research fills the gap by providing a model that can guide Omani organisations in particular to utilise the Intranet in managing organisational knowledge. Furthermore, the model presented not only gives a description of the use and benefits of the Intranet within Omani organisations, but also offers a prescription of the factors that need to be considered in the implementation of the Intranet and the consequent utilisation of the



technology to its full potential. In addition, the implementation model is an original contribution to knowledge. It can aid IT professionals in successfully implementing the Intranet.

### **8.4 Limitation of the Research and Areas of Further Research**

The research was the first to investigate the uses of the Intranet within the Omani private sector organisations which is an important contribution to IS and IT literature. The study identified some interesting issues, however, different variables could be added.

The research was a snapshot of the Omani companies' experience with the Intranet, and also the conclusions that have been drawn can give guidelines to Omani companies. However, a longitudinal study would shed more light on the uses and impact of the Intranet on the Omani organisation and the factors that influence those uses.

The study concentrated on the Omani private sector organisations, the conclusions that can be drawn may not be generalised to public sector organisations, therefore, this is an area worthy of further investigation which will enable a comparison be made between private and public sector organisations. Further research could be extended to include other private organisations in Gulf States and other developing countries in the Arab World.

The participants in the study were mostly IT professionals (IT directors and head of Intranet applications) because there were considered knowledgeable about the area of investigation and representative of the organisations in this research. However, their interpretation may be different from non-technical professionals, therefore, a balancing view from the standpoint of IT and non IT professionals may be a worthwhile area for further investigation.

Further research would best addressed these limitations to improve the quality of the conclusions drawn.

This study provides an initial model associated with an early stage of Intranet usage in knowledge management within the Omani organisational context. While many organisations studied have implemented applications, others reported that more are currently under development. This indicates that examination of Intranet usage in



knowledge management within Omani organisations would benefit greatly from continued research as the technology continues to mature.

Due to financial and time constraints, only one Omani organisation was investigated in details and the conclusion of this case study may not be generalisable to other Omani organisations. Future research should include more organisations.

One of the main challenges facing the researcher during the data collection stage was the qualitative element of the research (the 2 mini-case studies during the exploratory fieldwork and the case study during the main work) especially when some of the interviewees refused the idea of tape recording during the interview session. However, the researcher tried his best to take as many notes as possible and to arrange for second interviews and telephone follow up for clarification and confirmation. This process was time consuming and tedious, therefore future researchers, should be aware of the difficulty and time that is necessary for such case studies in that part of the world.

The findings provided in this study concentrate on the Intranet, future research should investigate the impact of the Extranet on Omani companies, since the Extranet is often considered an extension of the Intranet and growth of the Extranet is expected in the future. Additional research on the impact of the Extranet on Omani organisations, would provide useful information both to IS researchers and practitioners.

### **8.5 Recommendations for Practice**

The researcher would like to offer the following guidelines and suggestions for the Omani companies that are using the Intranet or thinking of adopting it:

- A committee should be formed consisting of IT and non-IT professionals (User department representatives) to investigate the needs of the company and to select IT system(s) which satisfy that need. This decision from the researcher's observation that some Omani companies were totally reliant on IT professionals to make that decision;



- The committee should be headed by a non-IT professional, senior manager;

This format of a committee and its leadership enables business needs be identified at all times during the specification process.

- Top management approval should be sought rather than assumed and any project should not be started without full top management approval and support;
- Gradual implementation of the Intranet should start with a pilot project to assess and evaluate the tasks and procedures involved. The pilot project is an opportunity to learn and avoid mistakes during the full Intranet implementation, thereby increasing the chances of success. The case study (Chapter Seven) and the two mini case studies (Chapter Four) suggest that Omani companies seem to be taking a conservative approach toward Intranet implementation and assimilation, preferring a gradual implementation to radical process changes. The gradual implementation philosophy may be based on taking the opportunity to learn and avoid mistakes and develop the necessary expertise, thereby increasing the chances of success. This conservative approach requires proper planning to re-evaluate business need and careful implementation. The gradual approach is arguably a good philosophy if it means proper planning and careful implementation. However, it may be a bad strategy if this gradual approach relates to the culture of Omani organisations in which taking a decision can take a long time. A drawback of this strategy is that companies may miss the opportunity of exploiting the full potential to gain competitive advantage of new the technology before others;
- User representatives should be involved from the start of the project and their needs, and concerns should be addressed and feedback should be taken into consideration.
- IT staff should be trained properly and continuously to be able to provide a better service and secure environment that can protect company knowledge from any unauthorised intruders. Furthermore, such training will enable them to integrate the Intranet smoothly with other existing systems;



- Users should be trained not only how to use the Intranet but on how the Intranet can help them to do their work faster, easier and better;
- Resources should be allocated for training, modification and upgrading of systems when required to keep in step with business needs;
- Top management should communicate the importance of the project (system) to the company and should motivate employees;
- A reward system should be based on the contribution of the employees to the share of knowledge with others, consequently contributing to company knowledge building;
- Balanced autonomy should be given to employees to access, share information to benefit the company;
- The contents should be continuously updated because the Intranet is only as good as the contents. The materials published on the Intranet should have value, be well structured and easily accessible to employees. Omani companies should be more attentive to the quality of material being published not the quantity;
- Arabic language should be used to publish the content of the Intranet to reflect the culture of the country and encourage those staff whose English is not good to participate in knowledge building to the companies;
- The Omani Government should establish a national policy to educate and train Omanis in IT and IS to meet the demands of the local market where there is a lack of skills and expertise;
- A national policy should investigate the country's needs in the area of IT and IS expertise and accordingly establish a long term programme to meet the demand.



## **8.6 Summary**

It is clear from the literature review that knowledge plays an important role in the organisational success and survival in an increasingly competitive and global market place. It is therefore, equally important for organisations to manage knowledge. Information Technology has been used over the past years to help organisations manage knowledge. This research has presented Omani organisations' experience of using the Intranet technology in managing organisational knowledge.

The research has suggested that knowledge management is a very complex issue and technology '*per se*' is not enough to ensure a successful use of the Intranet in knowledge management. Therefore, the study has suggested several factors to be integrated into using the Intranet in knowledge management within the Omani organisational context. The evidence suggests that the variation of the Intranet usage within Omani companies is attributed to IT Staff Training, Management Support, User Participation, Availability of Funding and Organisational Culture factors.

In addition to advancing theoretical knowledge in the areas of knowledge management, and Intranet, this research has practical implications for management. The results presented can be applied to real organisational settings in the sense that management can consider what organisation, technical, or contextual factors could affect the impact of the Intranet in the area of knowledge management. For example, it is clear that top management support is vital to the use of the Intranet. Based on these findings, the lack of senior level management involvement on organisation-wide implementation of the Intranet would certainly have a negative impact.

Likewise other factors such as IT staff training, user participation, availability of funding and organisational culture that this research found to influence the use of the Intranet should be considered and integrated in the adoption and implementation of Intranet based strategies for knowledge management in Oman.



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## **APPENDIX I**



## **PUBLICATIONS**

- Al-Gharbi, K., Al-Akaidi., M and McCormick, M.(2000) Factors Influencing the Use of the Intranet in Knowledge Management in Developing Countries, In Proceedings of the 10<sup>th</sup> Annual BIT Conference, The Manchester Metropolitan University. Manchester, November 1-2.
- Al-Gharbi, K., Al-Akaidi., M and McCormick, M.(2001) Toward an Implementation Model of the Intranet in Developing Countries Organisations: a case study of one Omani Organisation, In Proceedings of the BITWorld2001 Conference, American University in Cairo, Egypt, June 4 - 6.

## **Submitted Papers**

- Al-Gharbi, K., Al-Akaidi., M and McCormick, M, Factors Influencing the Use of the Intranet in Knowledge Management in Developing Countries, **Journal of Global Information Management.**
- Al-Gharbi, K., Al-Akaidi., M and McCormick, M, The Impact of the Intranet on knowledge management in Oman: a case study, **Journal of Information Management.**



## **APPENDIX II**



## **A survey on the impact of the Intranet on knowledge management**

**The main objectives of the research are twofold:**

- 1- To investigate the use of the Intranet in the area of knowledge management with the context of Omani organisations,**
- 2- To identify and examine which factors influence the use of the Intranet in knowledge management within Omani organisations.**

### **Your Role in this survey:**

- Please fill in the questionnaire by answering all the questions.**
- Every completed survey will make a considerable contribution.**

**Your participation in this survey is very critical to the success of my research.**

**I assure you that your answers will remain confidential and will only be used for academic purposes.**

**If you would like to receive an executive summary of the findings, please enter your e-mail address on the next page.**

### **Definition**

**The *Intranet* is the corporate (private) network based on the use of the Internet technologies.**

***Knowledge management* is a process of making knowledge and information easily accessible to the right people in the right place at the right time.**

**Thank you very much for your time and participation.**

**Sincerely,**

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## A survey on the Impact of the Intranet on knowledge management

Name of your organisation: \_\_\_\_\_

Your job title: \_\_\_\_\_

Email address(optional) \_\_\_\_\_

### Section 1. Background information

**Instruction:** Please put a tick ( ✓ ) in the box that corresponds to your answer. Choose only one answer for each question unless otherwise specified.

1- Approximately how many people are employed by your organisation?

- 10- 49 ☐
- 50-99 ☐
- 100-149 ☐
- 150-199 ☐
- 200 -299 ☐
- 300 -499 ☐
- 500-1000 ☐
- More than 1000 ☐

2-Approximately how many people are using the Intranet in your organisation?

- 10- 49 ☐
- 50-99 ☐
- 100-149 ☐
- 150-199 ☐
- 200 -299 ☐
- 300 -499 ☐
- 500-1000 ☐
- More than1000 ☐

3- When did your organisation adopt the Intranet?

- Six months ago ☐
- One year ago ☐
- Two years ago ☐
- More than two years ☐

4- Approximately what is the costs of implementing the Intranet in your organisation (including hardware and software, training etc.)

- Less than 1000 OR ☐
- 1000 to 3999 ☐
- 4000 to 5999 ☐
- 6000 to 7999 ☐
- 8000 to 9999 ☐
- I do not know ☐
- Other (please specify) \_\_\_\_\_



## Section 2. The uses of the Intranet

5- What are the uses of the Intranet in your organisation ? Please tick seven most important to your organisation.

- To publish mission statement , policy , rules ☐
- Organisation Charts ☐
- Directories ☐
- Training materials ☐
- Product specifications ☐
- Memos , Newsletters ☐
- Personnel manuals ☐
- Customer information ☐
- Financial reports ☐
- Vendor information ☐
- To access information in legacy database systems ☐
- Sales reports ☐
- Exchange of ideas and knowledge ☐
- Dissemination of lessons learned ☐
- Inventory information ☐
- user documentation's ☐
- To access applications ☐
- Job postings ☐
- Forms ☐
- Schedule meetings ☐
- Other use (please specify) \_\_\_\_\_  
\_\_\_\_\_



6- Intranet use can be categorised as one of the following levels:  
(Tick as appropriate)

- **Low** where information is published for one way communication ☐
- **Medium** where the Intranet is used for group discussion and collaborative applications ☐
- **High** where the Intranet serves as a common interface to all applications ☐

Circle or tick only one answer.

Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

7- The Intranet enables users to publish, update their information and access information without the help of IT, IS staff.

5                      4                      3                      2                      1

8- The Intranet enables users to access information without the IT/IS staff doing it for them .

5                      4                      3                      2                      1

9- The Intranet is an easy to use technology in comparison to previous systems.

5                      4                      3                      2                      1

10- The use of the Intranet saves the organisation money by allowing distribution of various documents and reports .

5                      4                      3                      2                      1

11- The use of the Intranet cuts the time and effort spent on printing , distribution of reports and documents .

5                      4                      3                      2                      1

12- The Intranet enables employees to access, share and retrieve information from and between different vendor platforms (PCs , UNIX , Macintosh , Mainframe, Mini frame ..etc.) .

5                      4                      3                      2                      1



Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

13- The Intranet improves communications between individuals and departments in our organisation .

5                      4                      3                      2                      1

14- The Intranet makes it easier for decision makers to access information.

5                      4                      3                      2                      1

15- The Intranet enables collaboration between different groups that share common interest .

5                      4                      3                      2                      1

16- The Intranet enables knowledge sharing between individuals and departments .

5                      4                      3                      2                      1

17- The Intranet enables employees to communicate directly to the highest level in the organisation regarding any problem or issue which is important to organisation .

5                      4                      3                      2                      1

18- Intranet enables the organisation to manage its knowledge .

5                      4                      3                      2                      1

19- The Intranet enables decision makers to communicate directly downward to organisation employees , avoiding message distortion .

5                      4                      3                      2                      1

20- The Intranet enables employees to do tasks they were unable to do previously.

5                      4                      3                      2                      1

21- The Intranet enables employees to do their job faster .

5                      4                      3                      2                      1



Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

22- Since the adoption of the Intranet , the Company is moving from paper-based output to a position ,where eventually all material will be eventually published on-line .

5                      4                      3                      2                      1

23- The Intranet enables employees to check customers requests , requirements and the latest news about their organisation while they are away from the company .

5                      4                      3                      2                      1

24- Through the Intranet I can communicate directly with other people in other departments .

5                      4                      3                      2                      1

25- The Intranet enables me to quickly identify where to go and whom to contact regarding any problem concerning my work .

5                      4                      3                      2                      1

26- Information published over the Intranet is more rich due to the use of graphics , animation ,audio and video when compared with printed material.

5                      4                      3                      2                      1

27- The Intranet provides an important tool by which the organisation can manage its knowledge .

5                      4                      3                      2                      1

28- Users in the organisation accept using the Intranet without any resistance.

5                      4                      3                      2                      1

29- Sharing key learning and accomplishments with other individuals and departments in the organisation is encouraged and rewarded by top management

5                      4                      3                      2                      1

30- The Intranet enables user to know what other individuals or departments are doing in the organisation.

5                      4                      3                      2                      1



### Section 3. Factors affecting the use of the Intranet \_\_\_\_\_

31- Which department first recognised the need for the adoption of the Intranet in your organisation ?

- Senior management ☐
- IT department ☐
- User departments ☐
- Consultant ☐
- IT supplier ☐
- Other (please specify) -----

Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

32- Top management initiation and support of the project is a crucial factor for the successful implementation and use of the Intranet.

5                      4                      3                      2                      1

33- Top management in my organisation were supportive of the Intranet project (e.g. motivated people to use it and made resources available).

5                      4                      3                      2                      1

34- Top management communicates their support for employees throughout the organisation to use the Intranet.

5                      4                      3                      2                      1

35- Top management communicates their support for the integration of computer-based applications with the corporate Intranet.

5                      4                      3                      2                      1

36- Top management considers the Intranet to be critical factor for the organisation.

5                      4                      3                      2                      1



Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

37- Resource availability for modification and enhancement of the Intranet system is very important for success in knowledge management.

5 4 3 2 1

38- Training users is very important for the successful adoption and use of the Intranet in knowledge management.

5 4 3 2 1

39- Training is very important for IT, IS staff in implementing and enhancing the Intranet.

5 4 3 2 1

40- The Intranet has adequate security to be used in knowledge management.

5 4 3 2 1

41- User participation in the development and implementation of the Intranet is very important for successful adoption and use.

5 4 3 2 1

42- Users (or user departments) participated in the adoption, design, and implementation of the Intranet in the organisation.

5 4 3 2 1

43- Does your organisation have the necessary technical expertise (e.g. Webmaster) ?

1- Yes ☐ 2- No ☐

44- Were users in the organisation provided with all necessary training to use the Intranet?

1-Yes ☐ 2- No ☐



45- Were the technical staff in the organisation provided with all necessary training to support, modification, upgrading, and security issues connected with the Intranet use?

1- Yes ☐

2- No ☐

46- Did the organisation implemented the Intranet in Phases? (e.g. Pilot project (One department), then to the whole organisation).

1- Yes ☐

2- No ☐

47- Please give priority order of 1,2,3,4 and 5 rank to the following factors, according to their importance, which in your opinion are essential to successful Intranet implementation and use.

- Top management support ☐
- User training ☐
- IT staff training ☐
- Availability of fund ☐
- User participation ☐

### IT Structure

Please circle the number that best describes who is primarily responsible for the following aspects of the Intranet:

IT, IS department	1
User department	2
IT,IS department and user department	3

48- Installing and maintaining Intranet hardware

1                      2                      3

49- Installing and maintaining Intranet software

1                      2                      3

50- Making decisions regarding the kind of Intranet applications put on the Intranet

1                      2                      3

51- Developing department Intranet applications

1                      2                      3

52- Updating content information on the Intranet applications

1                      2                      3



#### **Section 4. Open ended questions**

**53- What was the reason for the organisation adopting the Intranet?**

**54- Do you have concerns over the security of the Intranet? If yes what are these concerns?**

**55- How do you think the use of the Intranet will develop in your organisation?**

**56- Can the employees publish on the corporate Intranet? If yes what is the publishing procedure? And how long it takes?**



## **APPENDIX III**



## **Questions for the Interview(s)**

- 1- When did the organisation adopt the Intranet?
- 2- How many people are working in the organisations? And how many of them are using the Intranet?
- 3- What the reasons (drivers) for the organisation adoption of the Intranet?
- 4- Who recognised the need for the Intranet?
- 5- Who was involved in the final decision which decided the adoption and implementation of the Intranet?
- 6- What are the uses of the Intranet?
- 7- How did you implement the Intranet? (e.g. Pilot project of one department , then others).
- 8- What training or preparation was provided to IT and IS staffs before or during the implementation of the Intranet?
- 9- What training or preparation was provided for the users?
- 10- What are the factors that influence implementing and using the Intranet in knowledge management?
- 11- How do you think the use of the Intranet will develop in your organisation?
- 12- Do you have concerns over the security of the Intranet? If yes what are these concerns?
- 13- Can you give a rough estimate of the total costs of the Intranet implementation including (hardware, software and training)?
- 14- Does the move to knowledge management through the use of the Intranet represent a paradigm shift or do you think it will always be supplemental to traditional systems?
- 15- Can the employees publish on the corporate Intranet? If yes what is the procedure? And how long it takes?
- 16- Have you encountered any user resistance? If yes what did the organisation do to minimise users resistance to use the Intranet?
- 17- What are the benefits from the adoption of the Intranet?
- 18- What is the role of top management in the development of the Intranet project?



- 19- Did the Intranet bring any change to the business processes? If yes what is the change?
- 20- What is the role of the users in the development of the Intranet?
- 21- Has the implementation of the Intranet resulted in cost reduction? If yes can you give an estimate of the cost reduction?
- 22- Any comment you would like to add regarding this subject?



## **APPENDIX IV**



## Logistic Regression

Dependent Variable.. VAR00007 The Use of the Intranet

Beginning Block Number 0. Initial Log Likelihood Function

-2 Log Likelihood 80.860

\* Constant is included in the model.

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number

1.. IT Staff Training ITST  
Management Support MS  
User Participation UP

-2 Log Likelihood 30.720  
Cox & Snell - R<sup>2</sup> .545  
Nagelkerke - R<sup>2</sup> .752

	Chi-Square	df	Significance
Model	47.251	3	.0000
Block	47.251	3	.0000
Step	47.251	3	.0000

**The Result of Step Three: The Entry of the User Participation Factor in Stepwise Logistic Regression**



## **APPENDIX V**



## **A survey on the impact of the Intranet on knowledge management**

The main objective of the research is 2-fold:

- 1- To investigate the use of the Intranet in the area of knowledge management within Omani companies,
- 2- To identify and examine factors influence the use of the Intranet in knowledge management in the context of Omani private sector.

### **Your Role in this Pilot survey:**

- Please fill in the questionnaire and make a note of any question that seems difficult to understand and feel free to make any necessary modification you feel appropriate.
- I would appreciate suggestions for further questions, which may necessary to help achieve the research objectives.
- Please record how long it takes you to complete the questionnaire.

Your participation and feedback in this pilot survey is very critical to the success of my research.

I assure you that your answers will remain confidential and will be only used for academic purposes.

If you would like to receive an executive summary of the findings, please send me e-mail to the address below.

### **Definition**

The *Intranet* is the corporate (private) network based on the use of the Internet technologies.

**Knowledge management** is a process of making knowledge and information easily accessible to the right people at the right place in the right time.

**Thank you very much for your time and participation.**

Sincerely,

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## A survey on the impact of the Intranet on knowledge management

Name of your organisation: \_\_\_\_\_

Your job title: \_\_\_\_\_

### Section 1. Background Information

**Instruction:** Please put a tick ( ✓ ) in the box that corresponds to your answer. Choose only one answer for each question unless otherwise specified.

1- Approximately how many people are employed by your organisation?

- 10- 49 ☐
- 50-99 ☐
- 100-149 ☐
- 150-199 ☐
- 200 –299 ☐
- 300 or more ☐

2- Approximately how many users are using the Intranet in your organisation?

- 10- 49 ☐
- 50-99 ☐
- 100-149 ☐
- 150-199 ☐
- 200 –299 ☐
- 300 or more ☐

3- When did your organisation adopt the Intranet?

- Six month ago ☐
- One year ago ☐
- Two years ago ☐
- More than two years ☐

4- Approximately what is the costs of implementing the Intranet in your organisation (not only hardware and software but training etc.)

- 1000 to 2000 RO ☐
- 2000 to 4000 RO ☐
- 4000 to 8000 RO ☐
- 8000 to 16000 RO ☐
- Other (please specify) \_\_\_\_\_



**Section 2. The uses of the Intranet**

5- What are the uses of Intranet in your organisation ? **Please tick as many as appropriate to your organisation.**

- To publish mission statement , policy , rules ☐
- Organisation Charts ☐
- Directories ☐
- Training materials ☐
- To access information in legacy database systems ☐
- Exchange of ideas and knowledge ☐
- Dissemination of lessons learned ☐
- Inventory information ☐
- user documentation's ☐
- To access applications ☐
- Job postings ☐
- Forms ☐
- Schedule meetings ☐
- Other use (please specify) -----  
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6- I use the Intranet to:

**(Tick as many as appropriate)**

- Gather information ☐
- Do collaborative work ☐
- Provide information for others ☐
- Find the latest news about my organisation ☐
- Find others who are interested in the same issues that are interest me ☐
- Connect me to knowledgeable people ☐

**Circle or tick only one answer.**



Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

7- Intranet enables users to publish, update their information and access information without the help of IT, IS staff.

5                      4                      3                      2                      1

8- Intranet enables users to access information without the IT/IS staff doing it for them .

5                      4                      3                      2                      1

9- Intranet is an easy to use technology in comparison to previous systems.

5                      4                      3                      2                      1

10- The use of the Intranet saves our organisation money by allowing distribution of various documents and reports .

5                      4                      3                      2                      1

11- The use of the Intranet cuts the employees time and effort spent on printing , distribution of various reports and documents .

5                      4                      3                      2                      1

12- Intranet enables employees to access, share and retrieve information from and between different vendor platforms (PCs , UNIX , Macintosh , Mainframe, Mini frame ..etc.) .

5                      4                      3                      2                      1

13- Intranet improves communications between individuals and departments in our organisation .

5                      4                      3                      2                      1

14- Intranet makes it easier for decision makers to access information.

5                      4                      3                      2                      1

15- Intranet enables collaboration between different groups that share common interest .

5                      4                      3                      2                      1



Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

16- Intranet enables knowledge sharing between individuals and departments .

5 4 3 2 1

17- Intranet enables employees to communicate directly to the highest level in the organisation regarding any problem or issue which is important to organisation .

5 4 3 2 1

18- Intranet enables our organisation to manage its knowledge .

5 4 3 2 1

19- Intranet enables decision makers to communicate directly down ward to organisation employees , avoiding message distortion .

5 4 3 2 1

20- Intranet enables employees to do tasks they were unable to do .

5 4 3 2 1

21- Intranet enables employees to do their job faster .

5 4 3 2 1

22- Since the adoption of the Intranet , the company is moving from paper-based output to all material eventually being published on-line .

5 4 3 2 1

23- The Intranet enables employees to check the customers requests , requirements and the latest news about their organisation while they are away from the company .

5 4 3 2 1

24- Through the Intranet I can communicate directly with other people in other departments .

5 4 3 2 1



Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

25- The Intranet enables me to quickly identify where to go and whom to contact regarding any problem concerning my work .

5 4 3 2 1

26- Information published over the Intranet is more rich due to the use of graphics , animation ,audio and video when compared with printed material.

5 4 3 2 1

27- I think it is very important for the organisation to manage its knowledge .

5 4 3 2 1

28- Users in the organisation accept using the Intranet without any resistance.

5 4 3 2 1

29- Sharing key learning and accomplishments with other individuals and departments in the organisation is encouraged and reward by top management

5 4 3 2 1

30- The Intranet enables me to know what other individuals or departments are doing in the organisation .

5 4 3 2 1

37- The Intranet has a positive impact on the organisation

### Section 3. Factors affecting the use of the Intranet

31- Who first recognised the need for the adoption of the Intranet in your organisation ?

- Senior management ☐
- IT department ☐
- User departments ☐
- Consultant ☐
- IT supplier ☐
- Other (please specify) -----



Strongly agree	5	Disagree	2
Agree	4	Strongly disagree	1
Neutral (Neither agree nor disagree)	3		

32- Top management initiation and support of the project is a crucial factor for the successful implementation and use of the Intranet.

5 4 3 2 1

33- Top management communicates their support for the integration of computer-based applications with the corporate Intranet

5 4 3 2 1

34- Resource availability for modification and enhancement of the Intranet system is very important for success in knowledge management.

5 4 3 2 1

35- Training users is very important for the successful adoption and use of the Intranet in knowledge management.

5 4 3 2 1

36- Training is very important for IT, IS staff in implementing and enhancing the Intranet.

5 4 3 2 1

37- The Intranet has adequate security to be used in knowledge management.

5 4 3 2 1

38- User participation in the development and implementation of the Intranet is very important for successful adoption and use.

5 4 3 2 1

39- Users (or user departments) participated in the adoption, design, and implementation of the Intranet in the organisation.

5 4 3 2 1



40- Does your organisation have the necessary technical expertise (e.g. Webmaster) ?

1- Yes ☐

2- No ☐

41- Were users in the organisation provided with all necessary training to use the Intranet?

1-Yes ☐

2- No ☐

42- Were the technical staff in the organisation provided with all necessary training to support, modification, upgrading, and security issues connected with the Intranet use?

1- Yes ☐

2- No ☐

43- Did the organisation implemented the Intranet in Phases? (e.g. Pilot project (One department), then to the whole organisation).

1- Yes ☐

2- No ☐

**44- Please give priority order of 1,2,3,4 and 5 rank to the following factors, according to their importance, which in your opinion are essential to successful Intranet implementing and use.**

- Top management support ☐
- User training ☐
- IT staff training ☐
- Availability of fund ☐
- User participation ☐

#### **IT Structure**

Please circle the number that best describes who is primarily responsible for the following aspects of the Intranet:

IT, IS department	1
User department	2
IT,IS department and user department	3

45- Installing and maintaining Intranet hardware

1                      2                      3

46- Installing and maintaining Intranet software

1                      2                      3

47- Making decisions regarding the kind of Intranet applications put on the Intranet



1                      2                      3

48- Developing department Intranet applications

1                      2                      3

49- Updating content information on the Intranet applications

1                      2                      3

<b>Section 4. Open ended questions</b>
--

50- What was the reason for the organisation adopting the Intranet?

51- Do you have concerns over the security of the Intranet? If yes what are these concerns?

52- How do you think the use of the Intranet will develop in your organisation?

53- What factors do you think influencing the use of the Intranet in your organisation?